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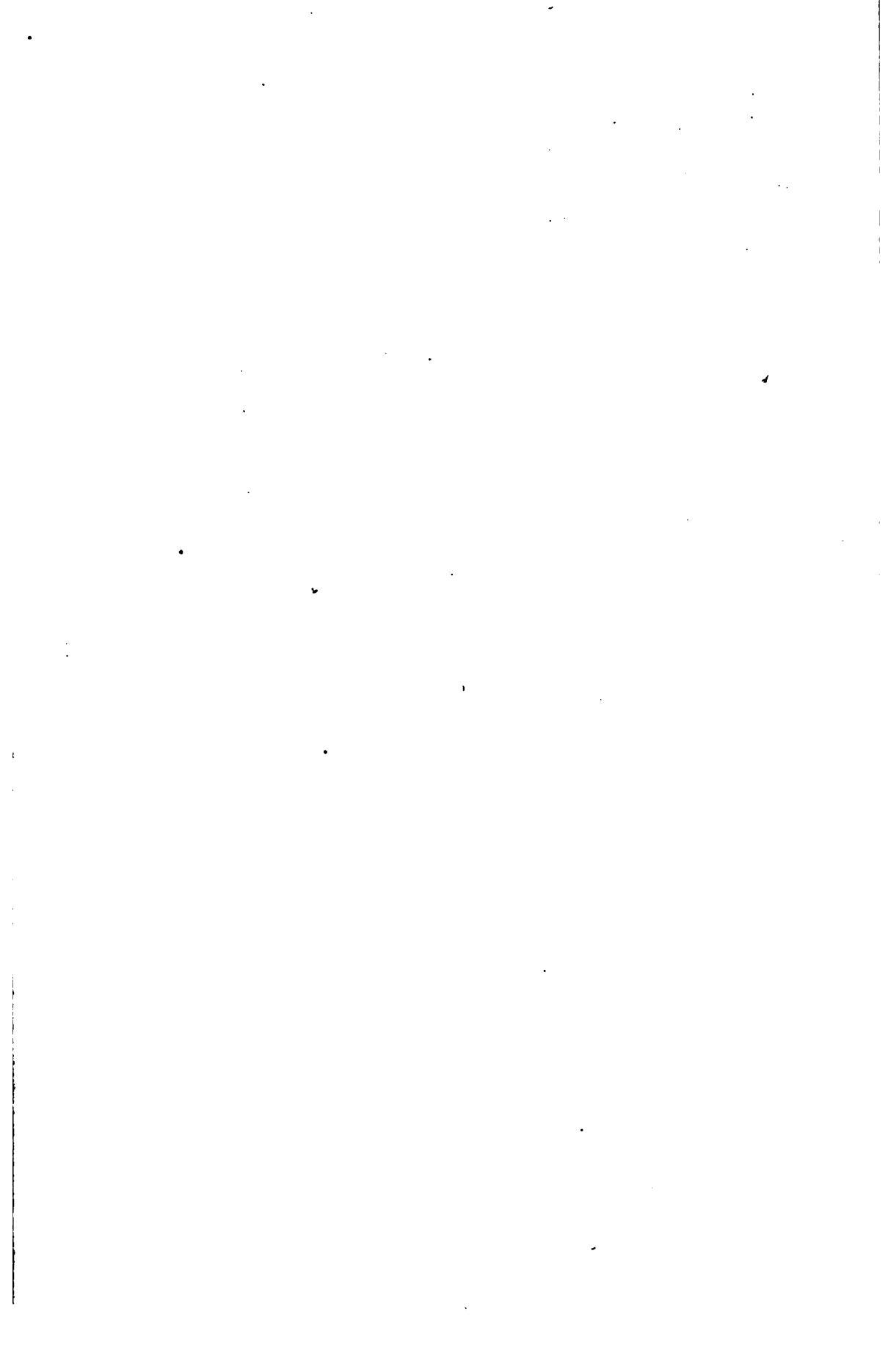
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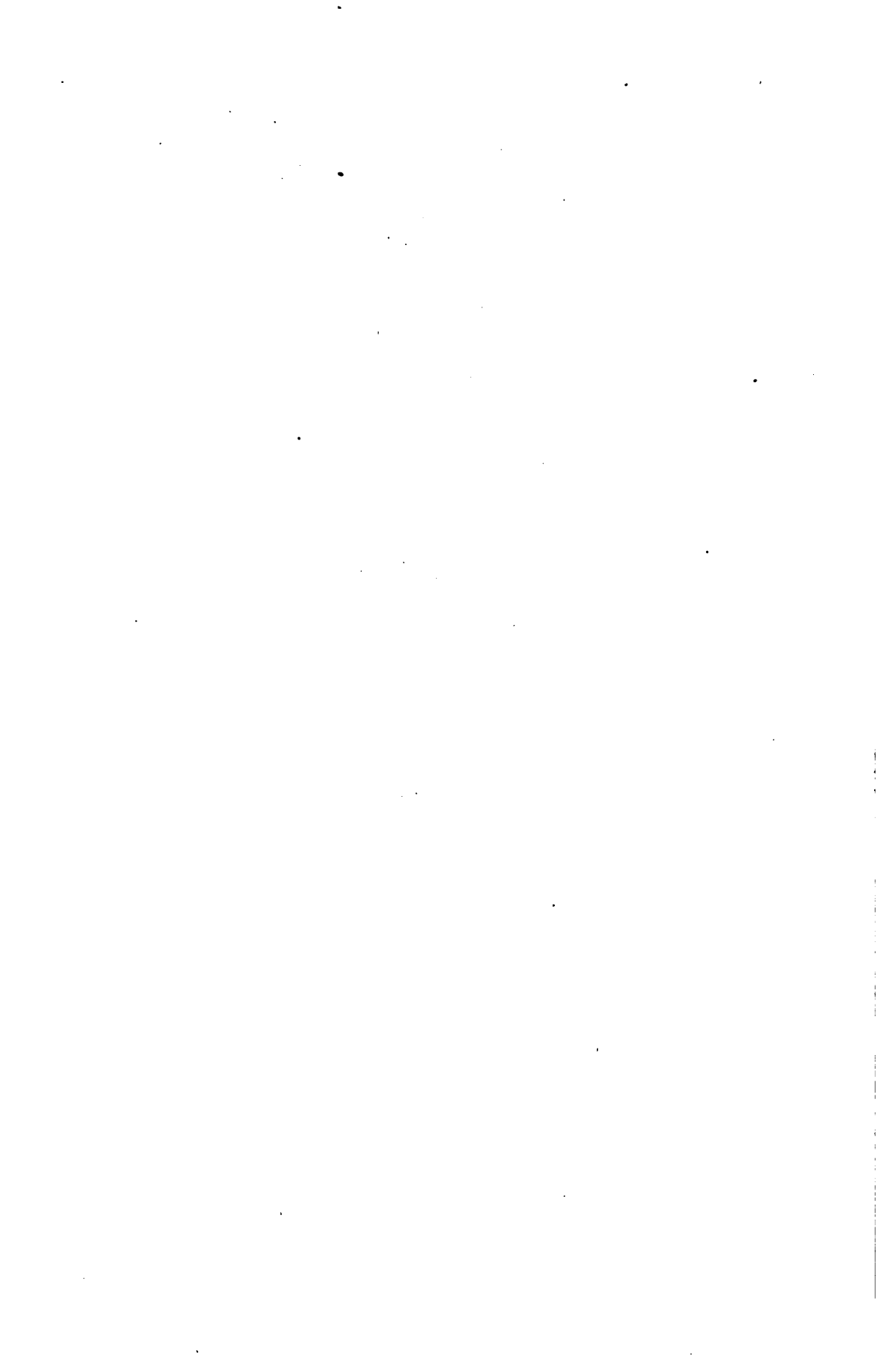
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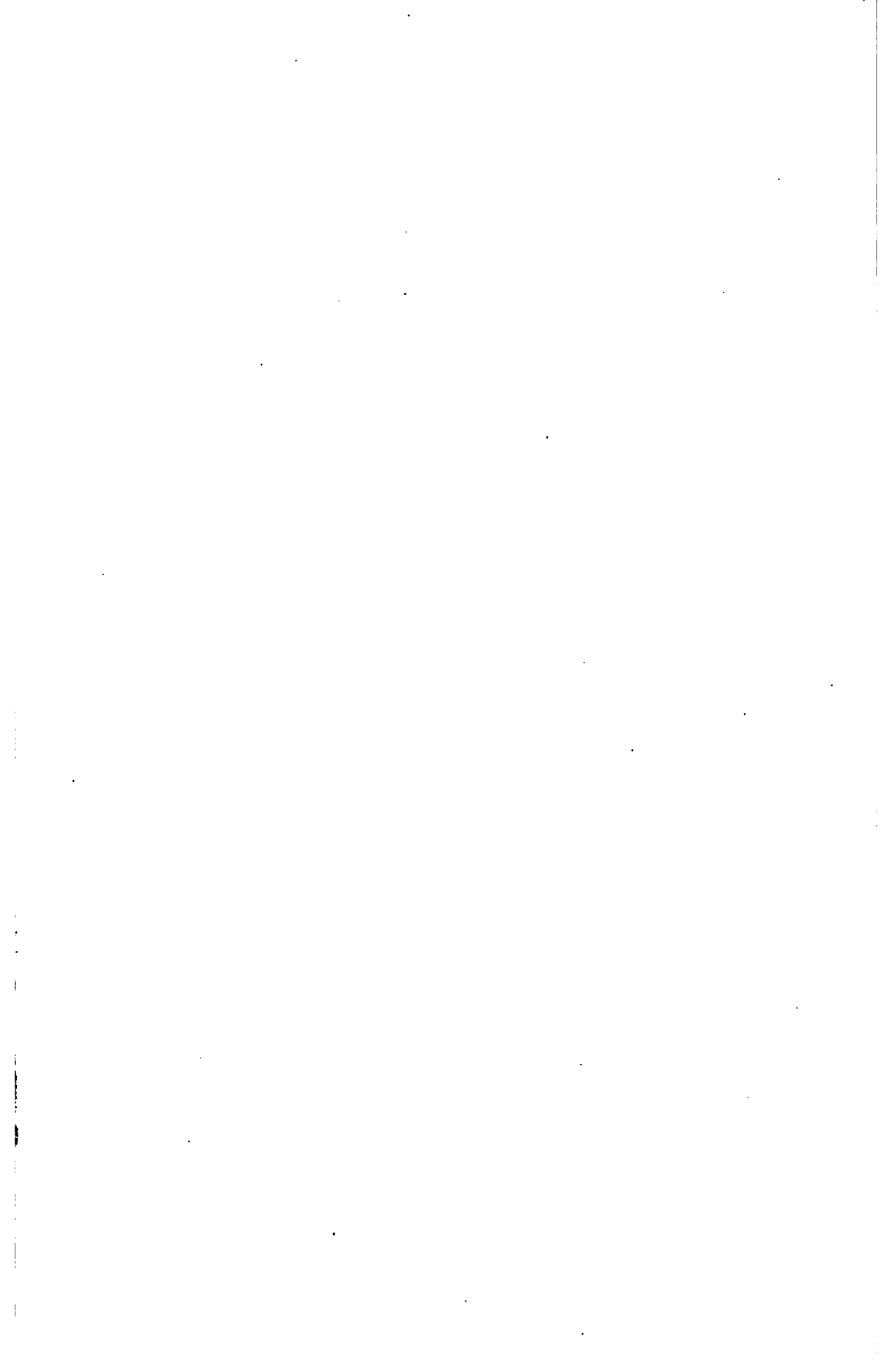
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THE
AMERICAN CYCLOPÆDIA.

VOL. III.
BOLAN PASS—CARMINE.

THE
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Popular Dictionary
OF
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BOLAN PASS

BOLAN PASS, a defile in the mountains of N. W. Beloochistan, between Dadur and Shawl, on the route between the lower Indus and the table land of Afghanistan. It consists of a succession of ravines rising 90 ft. to the mile for 55 m., when the summit is reached at a height of 5,793 ft. above the level of the sea.



Bolan Pass.

A small stream called the Bolan river flows down the pass, and after rains is a dangerous torrent. The British expedition to Afghanistan in 1839 spent six days, from March 16 to 21, in passing through this defile.

BOLAS, a missile weapon in common use among the Indians on the great South American plains, and especially among the gauchos of the Argentine Republic, chiefly used for capturing animals. It consists of two balls covered with leather, and united by a thin plaited thong

BOLE

varying in length from 6 to 8 feet. The gaucho holds one of the balls in his right hand, whirls the other round his head, and when sufficient momentum has been obtained sends them whirling like chain shot through the air. Striking the legs of an animal, the thong is tightly wound about them, rendering escape impossible. This weapon has often been used with great effect in war. The balls may be of stone, iron, or wood; those of iron, usually small, may be projected an amazing distance.

BOLBEC, a town of France, in the department of Seine-Inférieure, on the Bolbec river, 16 m. E. N. E. of Havre; pop. in 1866, 9,063. The ample water power furnished by the river Bolbec makes it a thriving manufacturing town. Its principal productions are cotton fabrics, but it has also woollen and linen factories, dye works, and tanneries.

BOLE (Gr. *βόλος*, a mass), an argillaceous earthy mineral which occurs in amorphous masses of various colors, as yellow, black, brown, and bright red, all derived from oxide of iron. The substance is probably disintegrated basalt. It has a conchoidal fracture, yields to the nail, and the streak is shining. When placed in water it absorbs it rapidly, and falls to powder. It was formerly employed as a medicine for its absorbent, astringent, and tonic properties; the last due, no doubt, only to the iron in its composition. It is still used in India in medicine, and in Europe for giving a color to anchovies and tooth powders, and as a medicine in veterinary practice. Analysis shows it to be a hydrous silicate of alumina, with varying proportions of oxide of iron, and very small quantities of lime and magnesia. It is used as food by some of the native Indians of South America, and the Japanese eat it to induce a thin and spare habit of the body. In Germany bole is calcined, washed, and ground for a paint, and employed to remove grease stains from cloth or wooden floors, and hence called *Bergseife*, mountain soap. The paint known as sienna, or burnt sienna, is a prepara-

tion of a chestnut-brown variety from Siena in Italy. It is fashioned into pipes by the North American Indians, Turks, and Germans.

BOLEYN, Anne. See **ANNE BOLEYN.**

BOLGRAD, a town of Roumania, in the province of Moldavia, at the head of Lake Yalpuh, connected with the mouths of the Danube, 105 m. S. S. E. of Jassy, and 28 m. N. N. W. of Ismail; pop. in 1866, 9,114. The inhabitants are chiefly Bulgarians. The houses are nearly all of stone. The town was formerly included in the Russian province of Bessarabia, but was ceded to Moldavia in 1857, in conformity with the Paris treaty of the preceding year.

BOLINGBROKE, Henry St. John, viscount, an English statesman and author, born at Battersea, London, Oct. 1, 1678, died Dec. 12, 1751. He was the son of Sir Henry St. John, bart., and of a daughter of the earl of Warwick. His early education was managed by his mother, on strict puritanical principles. After attending school at Eton, he proceeded to Christ Church college, Oxford, where he distinguished himself by the brilliancy of his parts rather than by diligence. After a tour on the continent in 1698-'9 he was married in 1700 to Frances, daughter of Sir Henry Winchcomb; but the union was unhappy, and they speedily separated. St. John's varied attainments and personal attractions rendered him a favorite in the fashionable circles of London, and before he was 25 years of age he was a notorious libertine. In the hope of interesting him in honorable pursuits, his father retired from the position of representative in parliament for the borough of Wootton Bassett, which was transferred to him, and he was thus brought into conspicuous public life. The Tories, under the lead of Rochester and Godolphin, were then in power, and St. John at once attached himself to them. In 1704 he entered the ministry as secretary at war, and for four years he discharged the duties of that office. When Godolphin became a Whig, and with Marlborough formed a new ministry, St. John retired to the country, and devoted himself to study. Two years later the Tories triumphed, and he was made secretary of state in the department of foreign affairs. In 1712 he was called to the house of lords with the title of Viscount Bolingbroke. Soon after the conclusion of the peace of Utrecht, in the negotiation of which he took an active part, a violent dissension broke out between him and his old friend Harley, then lord high treasurer and earl of Oxford, which did not terminate till Queen Anne had dismissed Oxford and made St. John her prime minister. The queen died a week later, and George I. dismissed him, as he was suspected of having plotted for the return of the Stuart family to the throne. He fled in disguise to France, and became titular prime minister to the pretender, James III. During his absence he was impeached by Walpole at the bar of the house of lords, and formally attainted. After the failure of the pretender's Scottish

expedition Bolingbroke was dismissed for neglect. He then sought a reconciliation with the Hanoverian party, but Walpole procured the prolongation of his exile, and for seven years he remained in banishment, residing principally at La Source, near Orleans, and devoting himself to belles-lettres and an active correspondence with Pope, Swift, and other literary contemporaries. His wife dying in 1718, he was privately married two years later to the widow of the marquis de Villette, a niece of Mme. de Maintenon. It was chiefly through her instrumentality, in bribing the duchess of Kendal, a mistress of King George, with the sum of £11,000, that he gained permission to return to his own country in 1723. He recovered his property, but being still excluded from the house of lords, he began writing political papers in the "Craftsman," under the titles of "An Occasional Writer" and "Humphrey Oldcastle," in which he attacked the ministry. His "Letters upon English History" and his "Dissertation upon Parties" formed parts of this series. Failing in his efforts to overthrow the ministry, he quitted England once more for France, in 1735 and remained abroad till the death of his father in 1742, when he returned to take possession of the family estate at Battersea. He passed his leisure in the preparation of his literary works, and in intercourse with his philosophic and literary friends, among whom were numbered many of the most eminent men then living. On his death he bequeathed his manuscripts and works to David Mallet, who published a complete edition of them, in 5 vols. 4to, in 1754. A new edition, with a life by Goldsmith, appeared in 1809, in 8 vols. 8vo. Among the most noteworthy of his writings, besides those already noticed, are "The Idea of a Patriot King," a "Letter on the Spirit of Patriotism," "Some Reflections on the Present State of the Nation," "Letters on the Study and the Use of History," and "Concerning Authority in Matters of Religion." They are written in a fluent, flexible, and eloquent style, combining an apparently profound philosophy with a sprightly and careless wit; but the rhetoric is sometimes artificial, the learning borrowed, and the thought unimportant. In spite of their serious defects, however, his writings for a long time influenced the tone of thought as well as the manner of writing of his age, and will ever occupy a distinguished place in the literary history of that epoch. As an orator, Bolingbroke held a high rank, but no complete specimen of his eloquence is now extant.

BOLINTINEANO, Demeter, a Roumanian poet, born at Bolintina, near Bucharest, in 1826. He early entered the public service, and soon afterward published in the newspapers of Bucharest several poems and articles which offended the government and caused him to lose his official position. The party of opposition, however, saw a valuable adherent in Bolintineano, and furnished him the means of studying in Paris,

whither he went in 1847. In 1848, on the outbreak of the Wallachian revolution, he returned, and edited the *Populul suveranu*, the organ of the democratic party. On the downfall of the revolutionary government he again went to Paris, and afterward to Turkey. Under the government of Prince Cuza, he found himself again at liberty to return to Bucharest, where he once more took an active part in political affairs through the journal *Dimbovitia*. After Prince Cuza's *coup d'état* (1864), Bolintineanu received a place in the cabinet, but preferred to exchange it for the office of councillor of state. His principal poetical works, collected and published in 1852, consist of lyrics and ballads on themes connected with his country (French translation by himself, *Brises d'Orient*, 1866). He has also published a romance entitled *Manilu*, which has attained much celebrity, and other prose works.

BOLIVAR, a W. county of Mississippi, separated from Arkansas by the Mississippi river; area, about 800 sq. m.; pop. in 1870, 9,782, of whom 7,816 were colored. It consists mainly of swamp land, part of which is subject to frequent inundations. The climate of the low lands is unhealthy, and extensive fertile tracts are consequently left uncultivated. The chief productions in 1870 were 182,728 bushels of Indian corn and 15,571 bales of cotton. There were 720 horses, 1,478 mules and asses, 1,414 milch cows, 8,099 other cattle, and 4,871 swine. Capital, Beulah.

BOLIVAR Y PONTE, *Simón*, the liberator of Colombia, born in Carácas, July 24, 1788, died at San Pedro, near Santa Marta, Dec. 17, 1830. He was the son of one of the *familias Mantuanas*, which then constituted the creole nobility in Venezuela. He was sent to Madrid to be educated, married there in 1801, and returned to Venezuela, where on his arrival his wife died of yellow fever. He visited Europe a second time, but in 1809 returned home by way of the United States, and after the revolution broke out at Carácas, April 19, 1810, accepted a mission to London to purchase arms and solicit the protection of the British government. In September, 1811, he joined the insurgents, was made lieutenant colonel on the staff of Gen. Miranda, and received the command of Puerto Cabello, the strongest fortress of Venezuela. The Spanish prisoners of war confined in the citadel of Puerto Cabello, 1,200 in number, having succeeded in overcoming their guards and in seizing the citadel, Bolívar evacuated the place and retired to his estate at San Mateo, and the fortress was immediately occupied by the Spaniards under Monteverde. This event obliged Miranda, on the authority of the congress, to sign the treaty of Vitoria, July 25, 1812, which restored Venezuela to the Spanish rule. Miranda endeavored to leave the country, but was arrested in the night at La Guayra by Bolívar and other officers, and surrendered to Monteverde, who despatched him to Cadiz, where after some

years' captivity he died in irons. Bolívar now went with his cousin Ribas to Cartagena, and enlisted there, from a number of refugees, 800 soldiers for an expedition against the Spaniards in Venezuela. To this force Manuel Rodríguez Torices, the president of Cartagena, added 500 men under the command of his cousin, Manuel Castillo. The expedition started in the beginning of January, 1813; and although Castillo suddenly decamped with his grenadiers, Bolívar kept on up the river Magdalena, driving the Spanish royalists from Tenerife, Mompox, and Cucutá, and arrived at Bogotá, at that time the seat of the congress of New Granada. Here Bolívar and Ribas were both made generals by the congress, and, after having divided their little army into two columns, they marched by different routes upon Carácas, gaining recruits at every step. The only serious resistance on the part of the Spaniards was directed against the column of Ribas, who however routed Gen. Monteverde at Los Taguanes, and forced him to shut himself up in Puerto Cabello with the remainder of his troops. On hearing of Bolívar's approach, Gen. Fierro, the governor of Carácas, sent deputies to propose a capitulation, which was concluded at Vitoria; and on Aug. 4, 1813, the liberating army entered the capital. Bolívar was honored with a public triumph, and having proclaimed himself "dictator and liberator of the western provinces of Venezuela"—Maríño had assumed the title of "dictator of the eastern provinces"—he created "the order of the liberator," established a body guard, and surrounded himself with the show of a court. By the conduct of his officers and by the suspicions which were prevalent that Bolívar aimed only at personal aggrandizement, the enthusiasm of the people was turned to dissatisfaction. The Spaniards recovered themselves and resumed the offensive. Jan. 1, 1814, Bolívar assembled a junta of the most influential inhabitants of Carácas, and asked to be relieved of the dictatorship; but the junta insisted that he should retain the supreme power. In June, 1814, the Spanish general Boves marched on La Puerta, where Bolívar and Maríño had formed a junction, and defeated them in a battle in which the patriots lost 1,500 men. Carácas was next taken, and Bolívar, defeated again at Aragua, fled to Cumaná, sailed with some of his officers to Cartagena, and thence went to Tunja, where the congress of the federal republic of New Granada created him commander-in-chief, with the double mission of forcing the president of the province of Cundinamarca to acknowledge the authority of the congress, and of then marching against Santa Marta, the only fortified seaport the Spaniards still retained in New Granada. He took Santa Fé, carrying the suburbs by storm, and Bogotá immediately capitulated and became the seat of the general government of New Granada. In his design against Santa

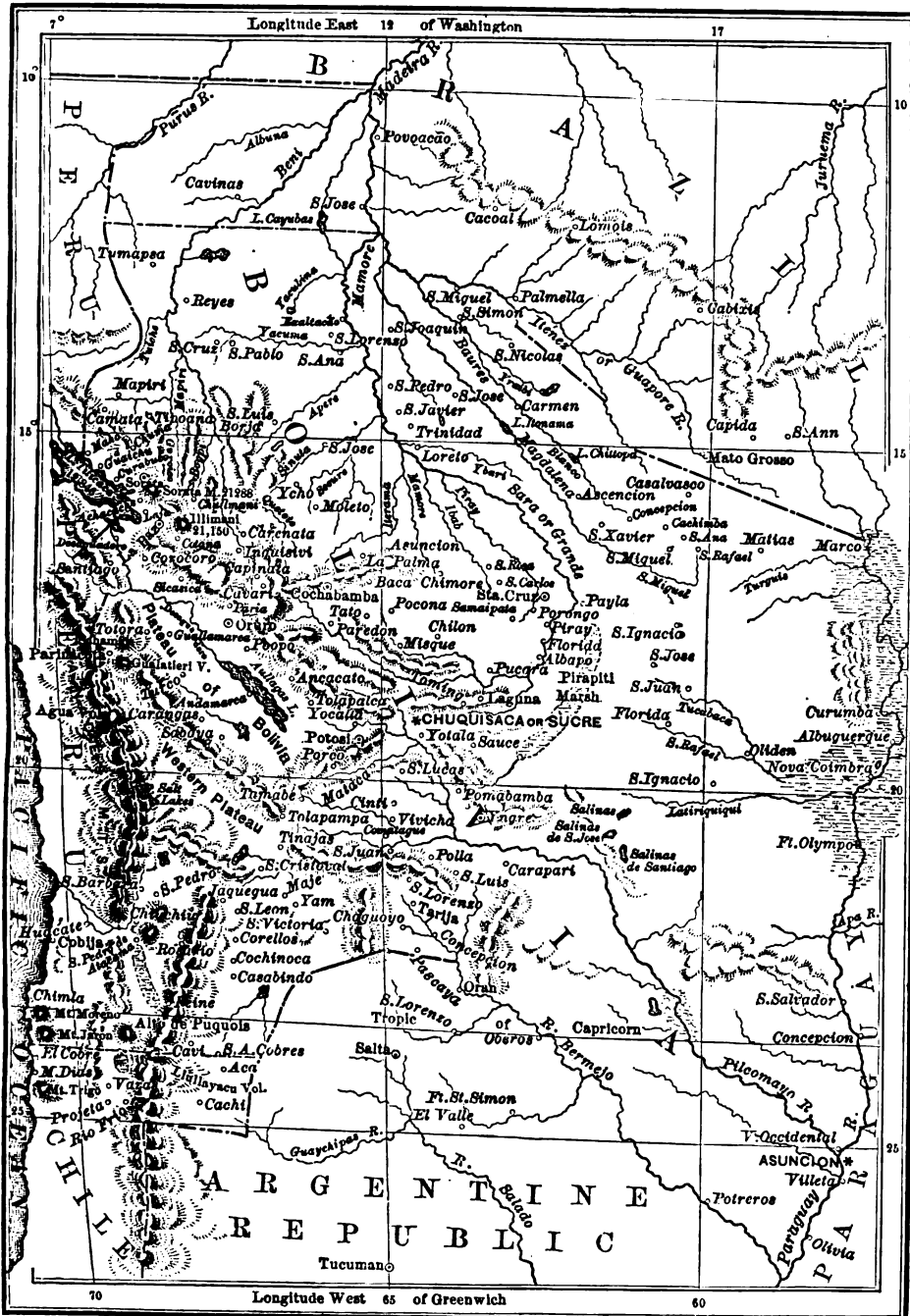
Colombian congress. But the influence of his friends in the congress was now weak, and he was forced to tender his resignation, notice being given that an annual pension would be granted to him on the condition of his departure for foreign countries. He accordingly sent his resignation to the congress, April 27, 1830, but prolonged his sojourn at San Pedro until the end of the year, when he suddenly died. A few days before his death he dictated a farewell address to the nation, complaining bitterly of the ingratitude of those to whom he had devoted his life and fortune. During his whole life Bolivar was never without malignant enemies, and he was constantly charged with cowardice and an ambition which aimed only at his own aggrandizement. But amid the conflicting reports of his biographers these facts stand forth strongly in his favor: that he conquered the independence of three states and secured their recognition by other nations; that he gave them laws which secured the better administration of justice; and that he died no richer from having had the control of the treasuries of Colombia, Peru, and Bolivia, and expended nearly all his own large fortune in the people's service. He was fond of pleasure, fame, and power, but patriotism and love of freedom were his ruling passions; and his energy, generosity, and endurance in misfortune were acknowledged even by his enemies. By decree of the congress of New Granada, his remains were removed in 1842 to Caracas, where a monument was erected in his honor; and in 1858 the city of Lima erected an equestrian statue of the "Liberator of the Peruvian Nation."

BOLIVIA, a republic of South America, lying between lat. 12° and 24° S., and lon. 57° 25' and 70° 30' W., bounded N. and E. by Brazil, from which it is partly separated S. E. by the river Paraguay, S. by the Argentine Republic and Chili, and W. by the Pacific ocean and Peru. Bolivia, however, claims that portion of the Gran Chaco comprised between the rivers Paraguay and Bermejo, which would extend its southern limits to lat. 26° 53' S. The republic is divided into nine departments, which, with their areas, capitals, and population in 1865, are as follows:

DEPARTMENTS.	Area.	Populat'n.	CAPITALS.	Populat'n.
Atacama.....	70,178	7,948	Cobija.....	2,500
Beni.....	150,000	54,000	Trinidad.....	4,885
Chuquisaca.....	72,798	219,788	Sucre.....	26,664
Cochabamba.....	96,808	379,788	Cochabamba.....	44,906
La Paz.....	48,051	619,465	La Paz.....	88,092
Oruro.....	21,600	111,818	Oruro.....	8,492
Potosi.....	54,297	990,804	Potosi.....	25,774
Santa Cruz.....	144,077	144,684	Santa Cruz.....	11,736
Tarja.....	114,484	108,800	Tarja.....	8,375
Total.....	677,288	1,581,585		

The departments are subdivided into 37 districts, and these into 45 provinces. No official survey of the country has ever been made, but the above areas are, with the exception of the

department of Beni, according to a map of Bolivia published in 1859 by Lieut. Col. J. Ondarza. Behm gives only 535,747 sq. m. as the total area; but the former is probably more correct. The population consists of native whites, for the most part descendants of the Spanish settlers, mestizoes or Cholos (mixed white and Indian), mulattoes, zambos (mixed Indian and negro), Indians in a domesticated state, and savage Indians. Of the last there are about 250,000, which added to the figures of the table gives a total population of 2,081,585, rather more than one fourth of whom are whites. The aboriginal is by far the most numerous element in the republic; it forms in the province of La Paz nine tenths of the population; in that of Tarija it is five times as numerous as the white. Of the many aboriginal tribes still existing in Bolivia, the most noteworthy are the Aymarás or Aymarás, Quichuas, Moxos, and Chiquitos. The first two, once united under the dominion of the incas, speak languages of kindred origin, while in their customs and manners little dissimilarity is noticeable. The Aymarás dwell chiefly in La Paz, although some are met with in Oruro; and the Quichuas inhabit the coast, the valley of the Desaguadero, and the N. and E. portions of the republic. Various monuments, such as obelisks, burial places, and other ruins, attest the proficiency in art and the high degree of civilization attained by the Aymará nation at an epoch far anterior to that of the incas. The Moxos (or Mojos) are remarkable for their ingenuity. The language of the Chiquitos is copious and flexible, and has a special vocabulary for females. The hair of this people does not whiten in extreme old age, but grows yellow. Most of these tribes have embraced Christianity and fairly entered upon the career of civilization. The Guarayos and Siriones are evidently descendants of a mixed race from the early Spanish settlers. In the tracts chosen by the Jesuits for their missions there linger the remnants of numerous indigenous nations, differing in language, customs, and dress. The Bolivian Indians are usually squat in figure, robust and muscular, and capable of enduring the greatest hardship and fatigue; and they are especially remarkable for the rapidity with which they perform long journeys, travelling on foot, at a sort of trot, for days in succession, with no other sustenance than coca leaves chewed with lime or ashes, and occasionally a small quantity of pounded maize. Though usually mild and passive, they sometimes yield to fearful outbursts of temper. All the tribes above mentioned dwell in houses or huts constructed of sun-dried bricks, rushes, or maize stalks thatched with grass. The uncivilized tribes, on the banks of the lower Beni and elsewhere, go naked, preserve the savage customs of their ancestors, lead a roving life, and subsist chiefly on game, wild roots, and fruits. The Spanish creoles are most numerous in the mining districts and in Cochabamba; and im-



migrants into the country since the separation from Spain have chiefly settled in these places and in La Paz. Pure negroes are rarely met with.—On the Pacific Bolivia has a coast line of 250 m. at most, including the sinuosities, which are numerous and of considerable extent. The shore is high and rugged, and in parts interrupted by lofty hills; while to the interior stretches an arid sandy desert, only habitable in narrow strips along the banks of the rivers. The passage across this desert and over the Andes is attended with many hardships; and transportation can only be effected on the backs of mules. In the time of the incas this wilderness was traversed from Peru to Chili by a paved road or path wide enough for a single person to walk on. There is at present but one road leading from the coast to the interior, from Cobija to Oruro. Until 1872 there were but two seaport towns of any importance on the coast. These were Cobija or Lamar, lat. $22^{\circ} 32' 50''$, a free port on the bay of Santa Maria Magdalena or Endymion, affording good anchorage for ships of any size, and shelter from the S. winds which prevail here; and Tocopilla, on the bay of Algodonales. But in that year the small town of Mejillones, on the bay of the same name, about lat. 23° S., was very considerably extended, owing to the recent discovery of rich silver mines in the district of Caracoles, equally divided between Chili and Bolivia. By the middle of the year referred to, 24 blocks of 300 feet square had been laid out, and a number of new buildings completed, these having been for the most part constructed on sites given by the government to families moving thither from Cobija, which town, it is supposed, will soon fall into decay after the railway now in process of construction from Caracoles to Mejillones is finished. Poor families received pecuniary assistance to enable them to move. The water at Mejillones is plentiful and excellent; an exception to the rule that on that part of the Pacific coast extending from Paita in the north of Peru to Valdivia in the south of Chili, water is neither abundant nor good. The bay of Mejillones, or Bahia de la Herradura (Horseshoe bay), S. of Cobija, has eight fathoms of water, and is sheltered by the Morro de Mejillones. North of Cobija bay are several shallow sandy bays with rocky points or promontories; but the most extensive inlet along the coast is Moreno bay (named from Mt. Moreno beside it, about 7,000 ft. high), lat. $28^{\circ} 29'$, 17 m. wide, but frequented only by coasters. Between Manina creek and the river Loa are several guano beds, still worked, but showing signs of exhaustion.—The most striking feature of Bolivia is its gigantic mountains. These separate in the southwest portion of the republic, between lat. 21° and 22° S., into two systems, the Cordillera Occidental and the Cordillera Oriental or Cordillera Real, the latter consisting of many lofty ridges. These two great chains unite again to the north in the ridge cluster of Apolobamba,

lat. $14^{\circ} 35'$ S. In the W. Cordillera, the following peaks rise beyond the limit of perpetual snow: Tacora, Tatasavaya, Pomarapi (21,700 ft. above the sea level), Parinacocha or Parinacota (22,030 ft.), Guallatiri or Gualatieri (21,960 ft.), Iquimo, Toroni, Yabricoya, and the volcanoes Isluya and Sajama or Sahama (22,350 ft.), this last being, with the exception of Aconcagua, the highest point in the new world. In lat. 21° S. this same chain widens in an easterly direction, presenting a number of snow-covered mountains, especially in lon. $68^{\circ} 20'$ and $68^{\circ} 50'$; and still further E., the volcanoes Ollagna, Olca, and Tica. The Cordillera de Lipez, the uniting link between the E. and W. Cordilleras, is mainly composed of snow-capped peaks terminating in slender needle-shaped points. In lat. 22° S. the Cordillera Oriental forms a *nudo*, or ridge cluster, having for its nucleus the Cerro de Chorolque; from which point the Chocaya and the Tasna and Ubina ranges stretch northward in two parallel ridges to lat. 20° S., where they unite at the *portillo* of Guasaco, one of the most elevated passes on the globe. A single chain, Frailes, continues thence to lat. 19° S. Here it takes the name of Cordillera de los Azanaques de Condo, and again breaking off into five distinct branches, terminates in the Nevado de Illimani, the loftiest of whose three summits rises 21,145 ft. above the sea. East of the Cordillera de los Frailes, and in the line of the Tasna and Ubina ridge (also named the Cordillera de Chichas), the great eastern chain forms the Nudo de Potosí y Porco, which is likewise the central point of the *nevados* of the same names. Beyond the limits of the hill country, which extends into the valley of the Rio Grande or Guapey to a distance of nearly 400 m. from the coast, lies the great Moxos plain, in which not even a pebble is to be found. During the wet season this region is flooded, and transit by boats is practicable in almost every direction through its dense forests. The country of the Chiquitos is rocky and elevated above the reach of inundation. Between the two great Cordilleras lies the valley of the Desaguadero, a vast inter-alpine plain, with an estimated area of 30,000 sq. m., which from its great elevation—13,340 ft. on an average—and the height of the mountains which surround it, might be called the Thibet of South America. In this table land, which is intersected by isolated hills and low mountain ranges, are Lake Titicaca, and the rich silver and copper mines of Corocoro to the north, while the S. part is mainly covered by a vast, solid, and almost uninterrupted crust of salt many inches thick, and nearly 5,000 sq. m. in extent. Between the mountain ranges stretching eastward toward the great wooded plain are numerous fertile valleys, principal among which is the Valle Grande.—Lake Titicaca, whose waters are divided between Peru and Bolivia, and whose shores were the chief seat of power of the incas, is situated in the table land just referred to. It is the largest inland lake in South America,

its length being variously estimated at from 80 to 120 m., and its average breadth being 40 m. Its surface is dotted with small islands, containing curious ruins. It was on one of these islands, also called Titicaca, that according to the legend Manco Capac and his consort, Mama Oello Huaco, the founders of the inca dynasty, descended to spread civilization through the surrounding nations. Into the lake flow a number of rivers, which during the rainy season are of considerable volume; and much of the water is drained off by the Desaguadero, its only outlet, a navigable river, varying in width from 25 to 60 yards, which, after a southerly course of nearly 200 m., flows into the swampy lake of Aullagas or Paria, whose surface is perhaps 490 ft. lower than that of Titicaca, and which has no visible issue. In Lake Aullagas are two islands, Panza and Filomena, the latter recently discovered. In the department of Beni is Lake Rognaguado, 1,100 ft. above the sea, with an area of about 900 sq. m.; and in a cultivated valley near Potosí is the remarkable Laguna de Tarapaya, situated in a circular basin on a sort of elevated lawn. While the water in the centre is constantly in a state of violent ebullition, the temperature at the brink is only about 93° F. It is said that in 1825, when an inundation rolled over Callao on the Pacific coast, the water disappeared for a time from this lagoon. There are numerous other lakes and marshes in the south and east, from which latter the Chiquito Indians extract copious quantities of salt; but little is yet known of their precise situation and extent. Bolivia is the centre of the watershed between the feeders of the Amazon and the Plata. The river Beni, whose head waters descend from the mountains near Cochabamba, receives among other tributaries the Mapiro and Coroico, holds first a N. W. and afterward a N. E. course, and joins the Mamoré, which takes its rise in the centre of the country, and flows in a generally N. course to lat. 10° 20' S., where with the Beni it forms the Madeira. Among its tributaries are the Rio Grande, which descends from the S. declivity of the lofty mountains near Cochabamba, and after an immense semicircular sweep falls into the Mamoré near Trinidad; and the Iténez or Guaporé, which, leaving Brazil about lat. 13° 20' S., forms part of the boundary between that empire and the republic until it unites with the Mamoré about lat. 11° 12' S. The Pilcomayo, formed by the united waters of the Cachimayo, Pilaya, and others, flows first E. and then S. E. to the Paraguay. The Bermejo rises in the province of Tarija, leaves the republic parallel with the Pilcomayo, and also joins the Paraguay. The Paraguay enters at the S. E., and, after forming for a distance of about 60 m. the S. E. boundary, leaves the republic in lat. 20° 25' S. All the large Bolivian rivers send their waters to the Atlantic, while the Pacific receives only the Loa, separating the republic from Peru,

and a few mountain streams which force their way through the desert of Atacama.—Trachytic conglomerates in various stages of decomposition are the dominant element in the formation of the maritime Cordillera, and also in that of the more elevated portion of the great plateau of Oruro, as the valley of the Desaguadero is frequently called; the trachyte of the latter region exhibiting, however, great quantities of quartz crystals and saline efflorescence, and being hence unfavorable to vegetation. Although it has been supposed that some of the conical summits of the Cordillera Occidental are extinct volcanoes, no volcanic production is anywhere exhibited in the table land, nor is this region ever visited by earthquakes. In the E. Cordillera granite appears to prevail from the Nevado de Illimani N. W.; its general direction is N. W. and S. E., but it is confined to the more elevated peaks. In its vicinity the trachytic formations invariably become micaceous. Overlooking Cobja is a mass of basaltic porphyry; and E. of the Cordillera Real a few spots of kindred origin mark the eastern limit of plutonic rocks in the lowlands. The Chiquito mountains are formed of gneiss with overlying foliated Silurian strata, the depressions in which formations are filled with sedimentary deposits, containing the fossil remains of colossal mammalia. Overlying this stratum is another of more recent formation, holding shells of existing species.—The mineral wealth of Bolivia consists chiefly in its almost inexhaustible silver mines, principal among which are those of the Cerro de Potosí, in whose conical summit there are over 5,000 openings. It is computed that the mines of this mountain yielded from 1545 to 1789 silver amounting in value to \$1,000,000,000; or with the government fifths or royal dues, and the amount smuggled, a total of \$2,000,000,000 in 245 years. This celebrated mountain still continues to give an annual yield of \$2,250,000. The name Potosí signifies an "eruption of silver." The Indians have at all times been the almost exclusive workers in the mines. Rich silver mines have been discovered in the Sierra del Limon Verde near Calamar, which are said to be greater than any hitherto found in Bolivia, and to yield ore equal to that of Potosí. Silver is also found in many other parts of the republic. Gold occurs in numerous parts of the mountain system. A huge mass of native gold detached by lightning from the base of Illimani was purchased at an enormous price, and sent to the museum of natural history in Madrid. In the sands of all the rivers descending from the Cordillera Real to the Beni or its affluents gold is found in abundance. The tin mines of Oruro are among the richest in the world; and copper is said to be as abundant in the mountains adjacent to Corocoro as was silver in the Potosí. Lead, salt, sulphur, nitre, and other volcanic products are found in large quantities; but these, in common with the

other sources of wealth in Bolivia, are of comparatively little value to the country, owing to the difficulty of transportation. There are innumerable thermal springs in the republic; those of Caiza in the district of Porco, and Urimiri and Machacamarcá near Lake Aullagas, are the most generally known.—Not more than half of Bolivia has a tropical climate, although nearly the whole republic is within the tropics. In the valley of the Desaguadero extremes of heat and cold are unknown. The year is divided into two seasons: the wet or summer, from November to April, when rain falls almost every day, and the nights are cold with occasional frost; and the winter, from May to October, when snow and rain are never seen. The summer is preceded and followed by snow storms. This valley is in general salubrious. The cold in the higher mountain regions is extreme; hail and thunder storms are frequent and terrific; and several maladies of a peculiar nature render abode in these parts exceedingly disagreeable. The *surumpé*, a violent inflammation of the eyes caused by the reflection of the sun's rays on the snow, is attended by severe pain, and sometimes delirium, while the *veta* or *mareo* (seasickness), called by the Indians *puna* or *soroche*, attacks travellers with weariness, blood-spitting, vertigo, fainting fits, &c., and sometimes terminates fatally. In the lowlands S. of the Cordillera Real the heat is oppressive in many of the valleys, and intermittent fevers are common. Goitre is prevalent in the Yungas valleys, but is not accompanied by cretinism as in some parts of Europe. Among the vegetable productions are the potato, which grows wild in many parts; quinoa (*chenopodium quinoa*), sometimes used as a substitute for the potato; the various cereals; and nearly all the fruits of the tropical and temperate zones. Cotton grows wild, and is of two kinds, yellow and white, both of a fine, long staple; the sugar cane is raised to a considerable extent; the coffee of the Yungas valley is of excellent quality; cacao is abundant on the Beni, and considered to be superior to that of Guayaquil; and the same province and Santa Cruz produce tobacco reputed equal to that of Havana. But perhaps the most important product of Bolivia is the coca, the annual sales of which in the market of La Paz amount to \$4,000,000. It grows extensively along the E. slope of the Andes, between 5,000 and 6,000 ft. above the sea. It is used by the Indians as betel is by the Asiatics and kava by the South sea islanders; and a refreshing tea is also made from it. The country produces in abundance copaiba, sarsaparilla, jalap, valerian, ipecacuanha, and other medicinal drugs; the *canela de clavo*, a species of cinnamon; and many varieties of gums, caoutchouc being abundant and of excellent quality. The fertile strips toward the coast, besides many of the inter-tropical products already mentioned, yield yuca, maize, and Algarobas; and the *arundo donax* is cultivated.

There are vast indigo fields; cochineal is produced; and flax, once prohibited by Spain, is now largely raised. Dyewoods are numerous; and the dense forests afford timber of great beauty, such as ebony, rosewood, mahogany, cedar, Brazil, and a variety of woods not commonly known. The slopes of the Andes are to an immense elevation covered with magnificent trees; here, and in the valleys and the ravines of the mountains, abound cinchona trees, and especially the valuable *C. Calisaya*, from lat. 19° S., following the almost semicircular curve of the Andes, and at an elevation varying from 2,500 to 9,000 ft. above the ocean. Their usual companions, the ferns, *melastomaceae*, arborescent passion flowers, and allied genera of cinchonaceous plants, are likewise found in rich profusion. The various species of cacti, acacias, and palms are found in their respective zones; as also the *maté*, or Paraguay tea, and a kind of mulberry, from the fibres of which the Indians prepare a beautiful yarn for shirts. A plant called *sapaonans* is used by the Indians to cure headache, and another called *zapatilla* as a laxative; and the leaf of the *matico* is applied to fresh wounds to draw out any foreign substance which might impede the cure. The cereals are sown on the table land, but do not ripen, and are cut green for forage. There are no trees here; the lower districts are clothed with a beautiful green turf, and the valleys with a coarse grass very good for pasture. The banks of Lake Titicaca are characterized by a luxuriant growth of rushes, used by the Indians to make huts, mats, boats, and for a multiplicity of uses.—The llama, vicuña, alpaca, and guanaco roam in great numbers in the elevated regions; horses, asses, and mules are plenty; and numerous herds of horned cattle find pasture on the banks of the rivers in the plains. The forests are infested with pumas or cougars, jaguars, ocelots, wild cats, and bears. There are several species of monkeys. Peccaries are destructive to the crops; the chinchilla is hunted for its fur; and the burrowings of the bizcacha (*lagostomus trichodactylus*) render travel dangerous on the plains. The flesh of the tapir, carpincho (river hog), sloth, glutton, armadillo, and of two species of wild boar is used for food by the natives. There are the condor, gallinazo, and several species of hawks, also a species of ostrich; and the multitude of birds in and about forest, lake, and river is incredible. Of reptiles there are the anaconda and the rattlesnake; and the rivers are infested by caymans. Lake Titicaca abounds in fish of peculiar forms; and in the rivers flowing to the Amazon is the bufeo, a variety of dolphin peculiar to these and the Brazilian waters. The vampire is troublesome in the plains, sucking cattle till death ensues; and there is a hornet called the *alcalde*, of enormous dimensions.—Determined measures have of late been taken to construct roads. Several lines of railway have been planned and

sanctioned by the government: one from Cobija to Potosí, and another to form a branch of the Peruvian railway from Arequipa to Puno. A line to connect La Paz with Achacache on Lake Titicaca was in progress in 1871, and to be opened in 1872. Work commenced in November, 1872, on a railway to connect Mejillones and the celebrated silver mines of Caracoles. The aggregate length of the affluents of the Madeira, with their tributaries, is 5,500 m., perhaps 3,000 m. of which navigated by steamers would afford an easy outlet for the productions of the country. Some steps have been taken in this direction, and the government, to facilitate their execution, has decreed that the rivers of the republic shall henceforth be open for free navigation by vessels of all nations; and in 1868 a New York engineer, Col. George E. Church, contracted for the establishment of a "National Bolivian Navigation Company" on the Madeira, the rapids of which will be avoided by a railway.—A coarse cotton cloth, *toeuyo*, is made in Cochabamba, Santa Cruz, La Paz, and other places, over 600 looms being constantly occupied in the first named city. Santa Cruz produces excellent cordage from vegetable fibres, leather, furs, glass, and other commodities. Fabrics of a fine quality are made with the hair of the llama, alpaca, &c., at La Paz; hats (from the wool of the vicuña) at San Francisco de Atacama; vessels of silver wire in the mining districts; and there are besides various common cloths made by the Indian women. All the Indians are acquainted with the manufacture of gunpowder.—The commerce of Bolivia is limited to the importation of cotton goods, hardware, furniture, jewelry, and silks, in exchange for Peruvian bark, guano, copper ore, tin, borax, hides, furs, woollens, and wool hats. To facilitate the development of trade, the port of Cobija has been declared free. The total imports in 1871 amounted to \$6,000,000, and the total exports to \$5,000,000. In 1859 the export of calisaya bark through the Peruvian ports of Arica and Islay amounted to \$158,970, and from January to November, 1860, to \$228,850. The internal trade reached in 1868 about \$50,000,000. The state mint at Potosí coins annually about 2,250,000 pesos in silver. The national assembly in October, 1872, adopted a law permitting the exportation of silver in bars from June 1, 1873, subject, however, to an export duty of 50c. per mark, and 20c. per oz. for gold. An export duty of 4 per cent. is still paid on good money.—By the provisions of the constitution of Bolivia, drawn up by Simon Bolivar in 1826, and considerably modified in 1828, 1831, and 1868, the whole executive power is vested in a president elected for a term of four years. The legislative authority rests with a congress of two chambers, the senate and the house of representatives, both elected by universal suffrage. The president appoints a vice president to assist him in his functions, and also a ministry divided into the departments of the interior and

justice, finance, war, and education and public worship. The ministers are liable to impeachment before congress. The seat of the executive government, formerly at La Paz, was transferred to Oruro in 1869. The standing army consists of 81 generals, 359 superior and 654 subaltern officers, 3,034 men, and 522 horses. The annual cost of the army is about \$2,000,000. The revenue in 1867 amounted to \$4,529,845, and the expenditures to \$5,957,275; deficit, \$1,427,930. The revenue is derived partly from a land tax levied upon the Indian population, and partly from the import and export duties, and the proceeds of mines and other state property. Peru pays annually to the Bolivian government \$506,250 for duties collected at the port of Arica on goods *in transitu* for Bolivia. The internal debt of the republic amounted on July 31, 1868, to \$2,181,215, and it was estimated that the interest then past due amounted to a like sum. The country has no foreign public debt, and no paper currency, although the notes of the bank of La Paz have been declared legal tenders.—There are in Bolivia three universities and 348 schools (primary, intermediate, and superior), 294 of which are for males and 54 for females. The annual expenditure for public instruction amounts to about 260,000 pesos. A school of architecture is to be established in La Paz. The religion of the country is Roman Catholic; and though no hindrance is offered to the exercises of other denominations, free and unrestricted toleration cannot be said to exist in Bolivia.—Bolivia was formerly called the presidency of Charcas, and afterward Upper Peru, and formed from 1767 a part of the viceroyalty of Buenos Ayres. It was erected into an independent state in August, 1825, and called Bolivia, in honor of Simon Bolivar. A constitutional assembly decreed, Aug. 11, a republican form of government, appointed Gen. Sucre president, and requested Bolivar to prepare a constitution. Sucre's administration continued till 1828, when he was forced to quit Bolivia by Gen. Gamarra, and was shortly afterward assassinated. His successor, Gen. Blanco, fell a victim to a revolution, headed by Balibian, two months after his inauguration. Mariscal Santa Cruz, then in Chili as minister plenipotentiary from Peru, was elected to the presidency in 1829, and remained in power till February, 1839. He was at the same time president of Peru, with the double character of protector of the Bolivio-Peruvian confederation. Velasco, aided by Balibian, raised a revolution, and having secured the overthrow of Santa Cruz usurped the executive functions, but was himself overthrown by Balibian. The country again pronounced in favor of Santa Cruz, which produced an invasion by Gen. Gamarra, for the purpose of reestablishing Peruvian influence. Balibian accompanied him for a while, but afterward took sides with the Bolivians, and defeated the Peruvian army at

Ingavi, where Gamarra was killed. President Balibian after five years was driven out by another revolution, and succeeded in power for a short time by Velasco, and subsequently by Gen. Belzú (1849). In 1855 Gen. Córdoba was elected president, but was forced to yield to Dr. Linares, who, after nine revolutionary attempts, succeeded in 1858, and exercised power more as a dictator than as president till 1860, in which year he was cast into prison by three of his own officers, one of whom, Acha, had already failed in an endeavor to stir up a revolution against Belzú. Congress, which had been silent for four years, named Acha provisional president in 1861. In December, 1864, Gen. Melgarejo rose against the government of Acha, who was defeated near Potosí in February, 1865. Melgarejo was recognized as president by almost the entire country; but during his absence Gen. Belzú arrived at the capital of the republic, and caused himself to be proclaimed president. Melgarejo soon returned, and took the city by storm. Belzú was killed by one of his own soldiers. An unsuccessful rising against the Melgarejo government took place May 25, led by one Castro Urquedas, whose forces were finally defeated at Viacha, near La Paz, in January, 1866. Bolivia joined in the same year the alliance between Peru, Ecuador, and Chili against Spain, which had just declared war against the last named republic; and one result of that step was a treaty between Chili and Bolivia settling the 24th parallel of S. latitude as the boundary line between the two republics. In 1867 Melgarejo ordered an election for president to take place, and declared that he would not himself be a candidate. In March 10,000 square leagues of fertile territory, watered by the Purus, Jurua, and Jutay, were ceded to Brazil. A revolution broke out in December for the restoration of Acha, who had been until then kept a close prisoner by Melgarejo, and who issued a proclamation enjoining the people to assist him in reestablishing the constitution of 1861, and promising to hold elections for a president irrespective of party or persons. The rebellion was terminated early in 1868, the insurgent leaders emigrating to the Argentine Republic. Melgarejo caused his cousin, one of the bravest officers in the army, to be shot for having attempted to raise a counter-revolution. In September Melgarejo issued a decree extending the rights of citizenship to all Americans. In spite of the continued dissatisfaction with his government, Melgarejo, with the unanimous consent of congress, proclaimed himself again dictator in February, 1869. In May he issued a decree restoring the constitution; but he nevertheless continued to exercise supreme control. The Bolivian government recognized the belligerent rights of Cuba in June of the same year. A new revolutionary movement was set on foot toward the close of October by A. Morales, who but a few years previous had attempted the overthrow

of President Belzú. This movement was speedily crushed, and was renewed with a like result in July, 1870. The following year witnessed a third attempt, which terminated in the complete overthrow of Melgarejo, who escaped to Peru, and was succeeded by Morales, elected for one year. Melgarejo was killed in Lima by his son-in-law, Nov. 23, 1871; and Morales was killed by his own nephew, Nov. 27, 1872.

BOLKHOV, a town of Russia, on the Nugra, in the government and 35 m. N. of the city of Orel; pop. in 1887, 18,491. There are upward of 20 churches, a monastery, and a nunnery. The houses are mostly built of wood. It has factories of gloves, hats, hosiery, leather, tallow, oil, ropes, &c.; and its trade is considerable.

BOLLAN, William, an English lawyer, died in 1776. He went to Boston, Mass., about 1740, married the daughter of Gov. Shirley, and in 1745 was sent to England to solicit the payment of more than \$800,000 advanced by the colony of Massachusetts for the expedition against Cape Breton. After three years he succeeded in obtaining this. In 1769, being in England, he procured copies of several letters calumniating the colonists which had been written by the governors Bernard and Gage, and sent them to Boston, for which he was denounced in parliament. In 1775 he recommended England to adopt conciliatory measures toward the colonies, and John Hancock declared that there was no man to whom the colonies were more indebted. He wrote several works relating to American affairs, among which are "Ancient Rights to the American Fishery Examined and Stated" (London, 1764), and "Freedom of Speech and Writing upon Public Affairs Considered."

BOLLAND, or **Bollandus, John**, a learned Jesuit, born in Limburg or in Brabant in 1596, died Sept. 12, 1665. In 1607 Heribert Rosweyde, a Jesuit of Antwerp, formed the design of collecting memoirs of the lives of all the saints; and this design being finally approved by the ecclesiastical authorities, Bolland was appointed to carry it into effect. At his request Godfrey Henschen was appointed in 1635 as his coadjutor. The plan pursued was chronological, taking up the saints in the order of the calendar, and the work was entitled *Acta Sanctorum*. The first two volumes, treating of the January saints, were published in 1643. The February saints, in three volumes, were completed in 1658. Bolland did not live to finish the March saints, although he prosecuted the work until his death. From Bolland the writers of the *Acta Sanctorum*, who have been appointed from time to time, have been designated as Bollandists. Five years before the death of Bolland the order appointed another colleague, Daniel Papebroek, and the work went on until the March and April saints were completed, and 16 days of May, when Henschen died in 1681. Other successive appointments followed, until, with

two interruptions (the first in 1778, when the order of Jesuits was abolished, and the second in the French revolution), the work reached 53 volumes. It was then for a time suspended, but resumed in 1837, under the patronage of the Belgian government, which appropriated annually 6,000 francs for the continuation of the work. Among the principal Bollandists, besides those already named, were Baert, Jan-ning, Bosch, Suykens, Hubens, Berthod, and Ghesquière. The 60th volume was published in 1867, in which year the Belgian government withdrew its annual appropriation.

BOLLINGER, a S. E. county of Missouri, drained by affluents of Little river; area, 500 sq. m.; pop. in 1870, 8,162, of whom 46 were colored. The St. Louis and Iron Mountain railroad passes through it. The surface is generally level and the soil fertile. The productions in 1870 were 51,286 bushels of wheat, 395,953 of Indian corn, 185,986 of oats, and 32,210 lbs. of tobacco. There were 2,579 horses, 2,173 milch cows, 3,806 other cattle, 9,808 sheep, and 18,938 swine. Capital, Dallas.

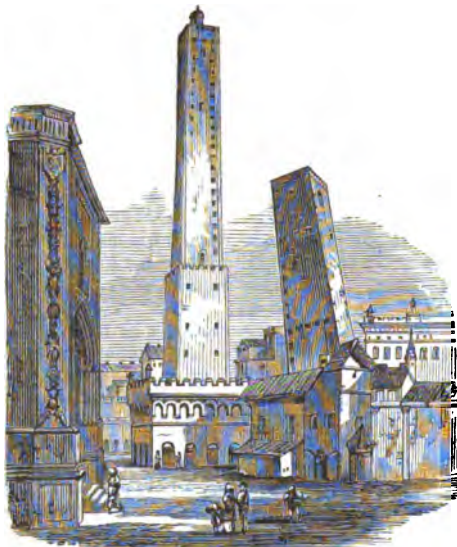
BOLLULOS DEL COUDADO, a town of Spain, in the province and 20 m. N. E. of the city of Huelva; pop. about 5,000. The streets are narrow, but there is one public square. The town contains several churches, schools, and convents, a town hall, a prison, and a hospital. The principal products are wine, oil, and brandy.

BOLLMANN, *Erie*, a German physician and politician, born at Hoya, Hanover, in 1769, died in London in 1821. He practised medicine in Carlsruhe and in Paris, having settled in the latter city soon after the outbreak of the great revolution. He accompanied Count Narbonne in his flight to England in 1792. About this time Lafayette was seized by the Austrians after he had crossed the frontier to avoid arrest by the revolutionary agents, and had been imprisoned at Olmütz. Great pains were taken by the Austrians to keep the place of his detention secret, and for a long time his family and friends could not learn where he was. Lally-Tollendal, who was then a refugee in London, became acquainted with Dr. Bollmann, and being greatly impressed with his courage and address engaged him to search for Lafayette. Bollmann for this purpose established himself as a physician in Vienna, and soon learned that Lafayette was at Olmütz. He now formed a plan to rescue him, in conjunction with Francis Kinlock Huger, a young South Carolinian then travelling in Austria, whose father was a personal friend of Lafayette. Dr. Bollmann made the acquaintance of the surgeon of the prison, and through him contrived to enter into correspondence with Lafayette, who at that time was allowed occasionally to take an airing in a carriage accompanied by two soldiers. On one of these occasions Bollmann and Huger waylaid the carriage, drove away the guards, rescued the prisoner, and mounted him on a horse, directing him to ride to Hoff, where they had stationed a car-

riage in readiness to receive him. Lafayette misunderstood the instruction given to him, and riding in the wrong direction was recaptured and sent back to prison. Bollmann escaped into Prussia, but was soon arrested and delivered up to the Austrians, by whom he was confined for nearly a year, but at length released on condition of quitting the country. He went to the United States, where he was well received, but in 1806 became implicated in Aaron Burr's conspiracy. In 1814 he returned to Europe, and after a second visit to this country settled in London. He wrote several works on banking and on political economy.

BOLOGNA. *I.* A province of Italy, bordering on Ferrara, Ravenna, Florence, and Modena; area, 1,891 sq. m.; pop. in 1872, 489,166. Its S. boundary is formed by the range of the Apennines, from which descend many streams flowing across the province. Of these the principal is the river Reno, which enters the Po di Primaro near Ferrara. The river lands of the northeast are marshy and subject to floods. The plain of Bologna, in the middle of the province, is very productive, and the valleys and lower slopes of the Apennines are well cultivated. It produces grain, oil, wine, figs, hemp, flax, almonds, and chestnuts, and is celebrated for its silk. The chief minerals are marble, gypsum, chalk, and a sulphate of baryta called Bologna stone, which becomes strongly phosphorescent on being heated with charcoal. The peasants are seldom land owners, but hold their farms from father to son, for a yearly rent of one half the product and taxes. The province is divided into the districts of Bologna, Imola, and Vergato. *II.* A city (anc. *Bononia*), capital of the province, beautifully situated at the foot of the Apennines, between the rivers Savena and Reno, 185 m. N. by W. of Rome; pop. in 1872, 115,957. It is surrounded by walls about 6 m. in circuit, is 2 m. long and 1½ m. broad, has 12 gates, and is divided into four quarters. The covered porticos or arcades, which afford protection in warm and rainy weather, present an animated appearance, especially in the modern part of the city; while many of the larger thoroughfares look comparatively deserted. The Montagnuola is the only public promenade within the walls. The finest square is the market place, or piazza Vittorio Emmanuele (formerly piazza Maggiore or del Gigante), with a famous fountain. The portico de' Banchi on one side of this square, and continued under the name of Paraglione, forms a continuous arcade 300 ft. long, with some of the finest stores. In this neighborhood are many palaces, prominent among which are the *palazzo pubblico* or *del governo*, and the *palazzo del podestà*, containing the archives, and having a lofty tower rising upon arcades. Many of the private palaces are hardly less remarkable for antiquity and works of art. Near the exchange is a large space, from which four streets branch off to the principal gates, and containing two famous leaning

towers (torre degli Asinelli and torre Garisenda or Mozza), respectively about 300 and 150 ft. high, and built in the 12th century. Remains of similar towers exist in various parts of the city. Conspicuous among the houses are the casa Rossini, in the via Maggiore, built in 1825 by that composer, who long resided here; the casa Lambertini, in the via della Campana, the birthplace of Pope Benedict XIV.; that of the



Leaning Towers, Bologna.

electrician Galvani, in the borgo delle Casse; and the residences once occupied by the painters Guercino and Guido. There are about 180 churches, including the ancient cathedral, restored in the 17th and 18th centuries, with famous relics and pictures; the elegant church of San Bartolommeo di Ravennana, of the 17th century, on the site of one built by St. Petronius; San Bartolommeo di Reno, with paintings by the Carracci; and San Domenico, with the tombs of St. Dominic, King Enzo, Taddeo Pepoli, and Guido. The church of San Francesco, behind the post office, which was one of the most extensive of all, was converted in 1798 into the custom house, but has lately been restored. Its bell tower is one of the finest in Bologna. The monument of Pope Alexander V., who was buried in this church, has been removed to the Campo Santo. The basilica of San Petronio, founded in 1390, is the largest church of Bologna, and, though unfinished, one of the most imposing, especially in the interior; over the great door stood the colossal bronze statue of Pope Julius II., by Michel Angelo, which was destroyed in 1511. The emperor Charles V. was crowned here by Clement VII. (1530), and the meridian line by Cassini was traced on its floor in 1653. Especially noticeable for its great antiquity and extent among the other churches is that of San

Stefano, formed by the union of seven chapels, and presenting a labyrinth-like and strikingly mediæval appearance.—The university, which is said to have been founded by Theodosius II. in 425, and is celebrated as the oldest in Italy and as the first to confer academical degrees, was the principal seat of learning in the middle ages, and acquired special renown in jurisprudence in the 12th century by the influence of Irnerius. Many thousand students gathered there in that period from all parts of Europe. Medicine, the arts, and theology were taught subsequently, in addition to civil and canon law. In the 14th century dissection was practised there for the first time, and at a later period its renown was increased by the discovery of galvanism. Many learned women acquired distinction here as teachers, and more recently in the chair of anatomy. The university is still attended by about 600 students annually, and retains a high reputation, chiefly in medicine. It was richly endowed by many of the German emperors, especially by Frederick I., by the princes of Italy, and by several popes; and the Bolognese were so proud of it that they had the academical motto, *Bononia docet*, engraved upon their coins. The library, in which Mezzofanti was employed for some time, contains about 200,000 volumes and 1,000 MSS. The institute of science was founded in 1690 by Count Marsigli, the friend of Newton, who also secured the establishment of an observatory, an anatomical museum, and a botanical garden, and presented the city with collections of natural history and scientific instruments. These various institutions are in the imposing palace of the university, in the strada San Donato, formerly the palazzo Cellesi. In the same street, in a former convent, is the academy of fine arts, or *accademia Clementina*, founded by Pope Clement XIII., with the celebrated *pinacoteca* or gallery of paintings by Bolognese masters. The *oploteca* contains a collection of arms and a library, and on the ground floor are various schools of design. Among the great educational institutions and public buildings is the *archiginnasio*, with a public library, the gift of Magnani, a native of Bologna. The Venturoli college, founded in 1825 by the architect of that name, is in the locality formerly used as the Hungarian college, and is an architectural school for students below the age of 20. Among the various societies is one for agriculture, and a Socratic society for humanitarian purposes. Bologna boasts of being the most musical city of Italy, and in 1872 conferred the freedom of the city upon Richard Wagner. The *accademia filarmonica* has a wide reputation, as well as the *liceo filarmonico* in the convent of San Giacomo, which is a musical school with a library of 17,000 volumes of printed music and the collections of Martini. The Zaprioni theatre is the largest, and the Corso theatre, built in 1805, is the most popular. The Contavalli theatre was built in 1814, partly on the site of a former con-

vent. The public cemetery, or *campo santo*, about 1 m. from the gate of San Isaia, on the site of the ancient Carthusian monastery Certosa, built in 1335 and suppressed in 1797, was consecrated in 1801 under the direction of Napoleon I., and is one of the finest and most extensive in Italy. It is approached by a covered portico of arches, and contains many large halls. The church of the monastery has been preserved, with its chapels and fine pictures. Among other interesting monuments, the cemetery contains a pantheon of university professors who are buried here, and whose busts are placed in the hall. A small separate space is reserved for the burial of Protestants. In the environs of the city there are many famous churches, including the nunnery and church of Madonna di San Luca, on the summit of the monte della Guarda, with a magnificent view, and a miraculous relic of the Virgin, attributed to St. Luke. This is a great resort of pilgrims, whose annual visit is celebrated by a public festival. It is approached by a covered portico of columns with 654 arches. Conspicuous among relics of antiquity are the ruins of the so-called baths of Marcus and of a temple of Isis.—Bologna is famous for poodle dogs and sausages (*mortadella*), but the pure breed of the former has become very scarce. There is an active trade in macaroni, salami, *cervellato* (a peculiar plum pudding, only made in winter), liqueurs, prepared fruits, artificial flowers, aromatic soaps, and particularly in silk. The wines of the vicinity are not bad, and among fruits the grape is the best. Bologna is regarded as the hottest city in Italy in summer, and as rather cold in winter, but the climate is healthy. The principal hotel occupies an ancient Roman palace, and there are many cafés. The local dialect, once admired by Dante as the purest of Italy, has become one of the most puzzling and least intelligible of all Italian jargons. The epithet *grassa* (fat) has been applied to Bologna on account of the epicurean habits of the inhabitants and the fertility of the environs. The Bolognese have been described by Tassoni as an uncontrollable people, in allusion to their sturdy spirit of independence. They rank at present among the most cultivated and public-spirited citizens of Italy.—Bologna was founded by the Etruscans under the name of Felsina. It was long held by the Boian Gauls, and in 189 B. C. became a Roman colony with Latin rights, under the name of Bononia. It was subsequently a place of much importance, figuring chiefly in the civil wars which followed the death of Cæsar, and retained its prosperity after the fall of the Roman empire. Charlemagne made it a free city. In the 12th century it attained the zenith of its greatness as a republic, which, however, fell in the subsequent century, owing to intestine strife among the nobles. After having been alternately under papal dominion and under that of the Geremei, Lambertazzi, Pepoli, Bentivoglio, and other local princely

families, who successively contended for supremacy, the city voluntarily became in 1513 a papal province, though retaining many of its ancient privileges till 1796, when the French united it with the Cisalpine republic, afterward incorporating it with the kingdom of Italy. In 1815 it was restored to the Papal States. In 1821 it became the focus of republican agitation and the seat of a provisional government, and the papal governor was obliged to leave the city; but the insurrection was put down after the occupation of the city by Austrian troops. The mismanagement of custom house officials in 1843 and other vexations became a new source of commotion, in consequence of which many Bolognese were arrested and others fled. On Aug. 14, 1848, an attempted Austrian occupation was gallantly prevented by the rising of the populace, and the invaders were expelled, leaving their dead and prisoners behind. After the conclusion of the treaty of peace with Sardinia, however, the Austrians returned with the concurrence of Pius IX., and after a resistance of eight days and a repeated bombardment, Bologna had to surrender, May 16, 1849, and an Austrian garrison occupied the city till 1859. Bologna then seceded from the Papal States, and in 1860 became with the rest of the Romagna part of Victor Emanuel's dominions.

BOLOGNA, Giovanni da, an Italian sculptor and architect, born at Douay in Flanders about 1524, died in Florence in 1608. He studied art when a youth at Rome and Florence, which last city he made his home. He surpassed all sculptors of his time except Michel Angelo, and few artists were charged with the execution of so many and such important works. His surname of Bologna seems to have been derived from the celebrated fountain in that city, designed by himself, of which the crowning colossal figure of Neptune is one of the wonders of art. At Florence, however, are to be found his finest works, such as the celebrated "Rape of the Sabine Women," a group in marble, and the equally celebrated bronze of Mercury.

BOLONCHEN, a village of Yucatan, 60 m. E. N. E. of Campeachy. In the plaza of the village are nine ancient wells, cut through a stratum of rock, and communicating with a common reservoir. In the vicinity is a large cave which contains seven pools of water, of which one is 450 ft. beneath the surface of the ground. These supply the village when the wells fail in the summer months.

BOLOR TAGH, or *Paleo Tagh*, properly the W. portion of the Karakorum range of mountains in central Asia, lying between the sources of the Gilgit and the Nabra, affluents of the Indus, and separating Cashmere from Chinese Turkistan. This range on the west merges in the Hindoo Koosh. The name is, however, generally applied to the Belur or Belut Tagh, a range which, running N. and S., connects the chains of Thian-shan and Kuen-lun, and forms the W. boundary of Chinese Turkistan.

BOLSENA (anc. *Volsinii*), a town of Italy, on a lake of the same name, in the province and 56 m. N. N. W. of Rome; pop. about 2,100. Volsinii, originally built on a height in the neighborhood, was one of the most powerful Etruscan cities. It was frequently at war with the Romans, who finally took it in 280 B. C., razed it, and built a new town on the present site of Bolsena, retaining the name. Of the Etruscan town there is no vestige, and even its site is uncertain; but the remains of the Roman one are numerous, including portions of temples and of an amphitheatre, and numerous sepulchres and tumuli, in which many Etruscan vases, statues, &c., have been found. The



Bolsena.

lake of Bolsena, which is supposed to fill an ancient crater, exhales a deadly malaria during the summer season. It is about 9 m. long, 7 m. broad, and 285 ft. deep, and is famous for its eels. The shores are formed by finely wooded hills, presenting much beautiful scenery; it has two small islands, called Martana and Bisentina, and it discharges by the Marta river, flowing into the Mediterranean.

BOLSWERT, or **Bolsward**, **Seetius Adam**, a Dutch engraver, born at Bolsward in Friesland in 1580, died in 1634. He executed many valuable engravings after designs of Bloemaert and Rubens.—His younger brother, **SOHELTIUS**, rose to higher fame in the same art, especially distinguishing himself by his prints after some of the best works of Rubens and Vandyke. Both brothers practised their art at Antwerp.

BOLTON, or **Bolton-le-Moors**, a manufacturing town and borough of Lancashire, England, 11 m. N. W. of Manchester; pop. in 1871, 82,854. The Croal, a tributary of the Irwell, divides the place into Great and Little Bolton. The manufacture of woollens was introduced here by the Flemings in 1337, but the inventions of Arkwright and Crompton, both natives of the place, laid the foundation of its present prosperity.

It is now one of the principal seats of the cotton manufacture in England. The bleach and dye works here are among the largest in the kingdom, and it has also print works, extensive foundries, steam engine and machine works, paper, flax, and saw mills. Numerous coal pits are worked in the vicinity. The town is well supplied with water, and is connected by canal and railway with Manchester and Bury, and by railway with Liverpool, Preston, Leigh, and Blackburn. It sends two members to parliament.

BOLZANO, **Bernhard**, a German philosopher and Roman Catholic theologian, born in Prague, Oct. 5, 1781, died there, Dec. 18, 1848. He

was professor of divinity in the high school of Prague from 1805 to 1820, and, supported by the archbishop of Prague, withstood the opposition of the ultramontanes, who regarded him as a follower of Schelling. In 1820 he was suspended, and hampered in his literary activity and social intercourse. His high character, piety, and benevolence secured for him a host of friends, and he lived for many years on the estate of one of them near Prague, and afterward in that city with the assistance of Count Leo von Thun. His

principal works are: *Lehrbuch der Religionswissenschaft* (6 vols., Sulzbach, 1834); *Wissenschaftslehre, oder Versuch einer neuen Darstellung der Logik* (4 vols., 1837); and *Athanasia, oder Gründe für die Unsterblichkeit der Seele* (2d revised ed., 1838).

BOMARSUND, a narrow channel between the island of Aland and Vardö, at the entrance of the gulf of Bothnia. This channel was formerly commanded by the strong Russian fortifications on the S. E. extremity of Aland, which were destroyed by the allied fleets in 1854.

BOMBAY. I. A province (formerly presidency) and one of the ten great governmental divisions of British India, bordering on the Arabian sea, and lying between lat. 14° and 29° N., and lon. 66° and 77° E. It comprises a strip of territory about 900 m. in length, extending from the northern limit of Sind to the kingdom of Mysore on the south, along more than two thirds of the W. coast of Hindostan. Its greatest breadth is 250 m. According to the British parliamentary accounts for 1870, the area is 87,000 sq. m., and the population in 1871 was 13,983,998. The province contains 22 districts, apportioned among three commissionerships, Sind in the north, and the northern

and southern divisions of Bombay proper, in which are comprehended Ahmedabad, Kaira, Surat, Broach, Bombay island, Darwar, Candeish, Tanna or North Concan, Rutnagherry or South Concan, Poonah, Ahmednuggur, and Canara. The large native feudatory states of Cutch and Guzerat, the chiefs of which are subject merely to British supervision, intervene between Sinde and the northern and southern divisions. The coast line is about 1,050 m. in length. Considered with reference to its physical characteristics, the province is divisible into four regions: 1, the Sinde territory, in the north, comprising the low and level basin of the Indus, where strips of exceedingly fertile country alternate with deserts produced by lack of irrigation; 2, the two Concans, which form the rugged and hilly maritime belt, about 380 m. long and from 25 to 50 m. wide, lying between the Western Ghauts and the Arabian sea; 3, the eastward slope of the Western Ghauts; and 4, the flat, alluvial tracts W. of the gulf of Cambay, in the Nerbudda districts. There are great meteorological differences between these several regions. The climate of Sinde is exceedingly sultry and dry, with a very light

rainfall, and an average maximum temperature at Hydrabad, the capital, of 98.5° F. in the shade. In the Concans, on the other hand, while the heat is as great, the annual fall of rain is much larger. This is due to the action of the Western Ghauts in condensing the vapors of the S. W. monsoon as it blows in from the sea; but the same cause leaves the eastward slope of the range comparatively rainless. At Bombay island the average annual temperature is about 80° F., with a maximum of about 100° in the shade; and the rainfall averages 80 inches per annum, sometimes rising nearly to 100 inches. The Western Ghauts are the most important mountains in the province; within its boundaries the altitude of the range varies from 1,000 to 4,700 ft. The Indus, Nerbudda, and Taptee are the principal rivers. The vegetable productions comprise cotton and rice in the coast districts, sugar and indigo in Candeish, and wheat, barley, hemp, and tobacco in Sinde. Opium is manufactured in the native states of Malwa and Guzerat, and merchants who wish to send it to the city of Bombay obtain permits from the government at a certain price per chest. Consider-



Bombay, from Malabar Hill

able quantities of silk are raised, and there are silk manufactories in some of the towns. The land revenue system of Bombay was carefully planned and put in operation about 20 years ago. It provides for a survey and assessment of the whole province, which work is now almost completed. With few exceptions, the occupants of the land hold directly from the government, and pay their rent to government officers. The fields are mapped, and marked out by permanent objects, to remove which is a penal offence; they are then classified for assessment, with reference to the soil, climate, proximity to market, and other external conditions. When the existing rate was fixed, it was equal to one half the yearly value of the land; but in consequence of the general im-

provement of the country the proportion is now not more than one fourth or one eighth of that value, except in the poorer districts. A revision of the assessment may be made at the end of every 30 years. The land revenue yields a larger sum per capita in Bombay than in any other province of India. The administration is vested in a governor appointed by the crown with the advice of the secretary of state for India. He is assisted by three councillors and a legislative council. There are 800 schools in the province, under government supervision, with an attendance of 13,000 scholars, five sixths of whom are instructed in the native languages only, the remainder being taught English. Religious establishments are maintained by the churches of England and

Scotland. In the year ending March 31, 1870, the value of the imports into the province was £22,232,435, and of the exports from it £24,690,819. The length of the railway lines open for traffic there on Dec. 31 of the same year was 1,184 m. The chief towns, in addition to the city of Bombay, are Hyderabad and Kurrachee in Sind, Surat and Baroda in the region E. of the gulf of Cambay, and Poonah in the highlands E. of the Ghauts, 2,000 ft. above the sea level.—The sepoy mutiny of 1857 did not attain any serious magnitude in Bombay. A few conspiracies were detected in widely separated localities, and immediately suppressed. The native troops remained for the most part faithful to the British. Two ring-leaders in a plot for the massacre of all the European residents of the capital were summarily punished by being blown away from the mouths of cannon. II. A city, capital of the province, picturesquely situated on an island of the same name close to the W. coast of Hindostan, in lat. 18° 56' N., lon. 72° 53' E., separated from the mainland by an arm of the sea; pop. in 1871, 646,636, of whom about 450,000 were Hindoos, 120,000 Mohammedans, 80,000 Parsees, and 8,000 Europeans. The island, which was the first possession ever acquired by the British in India, is 8 m. long and nearly 3 m. wide, and the city occupies its southern extremity. Toward the close of the 15th century it was conquered by the Mohammedans, who ceded it to the Portuguese in 1580. Shortly before the marriage of Charles II. and Catharine of Bragança, infanta of Portugal (1662), it was conveyed to the English crown as a portion of the dowry of that princess. About seven years later the king transferred it to the East India company, who held it at an annual rental of £10 sterling up to the year 1859, when the home government assumed direct control of all the British East Indian possessions. Bombay is the busiest and in appearance the gayest of the cities of British India. The ancient portion is known as the Fort, and contains numerous handsome buildings. The houses within the walls are built of wood, surrounded with verandas, and covered with sloping roofs of tiles. The poorer classes occupy dwellings of clay thatched with palmyra leaves. There are many large store-houses and commercial establishments, and in the European quarter are numbers of fine residences. Of the public buildings the more prominent are the Anglican cathedral, the various churches, temples, and synagogues, the government house, the town hall, the custom house, the Grant college of medicine, and the hospital founded by the Parsee merchant Sir Jamsetjee Jejeebhoy, and bearing his name. The city is now connected with the neighboring island of Salsette by means of a recently constructed causeway and arched stone bridge. By far the most interesting structures in the vicinity of Bombay are the celebrated cave temples of the Buddhists, excavated from the

solid rock and adorned with colossal statues, on the island of Elephanta, which lies at a distance of from 6 to 8 m.—The harbor of Bombay, as the name of the city indicates, is safe and commodious, being one of the best in all India. It is enclosed by Colabba, or Old Woman's island, Bombay island, and the island of Salsette, on the west and north, and by the islands of Elephanta and Caranja, together with the mainland, on the east. It is between 12 and 14 m. long, between 4 and 6 m. wide, and has a depth of from 7 to 14 fathoms. A lighthouse 150 ft. high stands on the southern end of Colabba island. The rise and fall of the tide are sufficient to permit the construction of wet docks capacious enough for building large ships; and in those belonging to the East India company merchant vessels of the largest class, and even frigates and line-of-battle ships, have been built by the Parsees. As the material used for ship building at Bombay is exclusively teak, the vessels constructed there are noted for their durability. The city is both a naval and a military station, but the fortifications, although extensive, are not adequate for defensive purposes against a well equipped foe. Preëminent among the natives for their intellectual capacity, their industry, their business ability, and their great wealth, are the Parsees, the descendants of the ancient fire-worshippers. Socially, commercially, and politically, they constitute, after the Europeans, the most influential class in Bombay. Their walled cemetery, carefully guarded, stands on the summit of Malabar hill, the most fashionable suburb of the city. It contains five round towers, each about 60 ft. in diameter and 50 ft. in height, and surmounted by a large grate. The bodies of the newly dead are placed upon these towers, and when the vultures have removed the flesh from the skeleton, the bones fall through the grate into the enclosure beneath.—The external trade of Bombay is very extensive, and is carried on principally with Great Britain, France, China, Mauritius, and the ports of the Arabian sea and Persian gulf. Cotton is by far the most important article of export. The rise in price and the increased demand growing out of the civil war in America were followed by an era of the wildest speculation in commercial circles at Bombay, from 1862 to 1865, resulting in a financial panic so disastrous that for a time there was said to be not one solvent merchant in the entire city. The exceptional activity of this period, however, contributed in no slight degree to its present prosperity. The exports of cotton to Europe for six years ending with 1872 averaged nearly 1,100,000 bales a year. In 1863-'4 opium to the amount of £5,648,158 was exported, principally to China. The other leading exports, in the order of their total values, for the same year, comprise wool, seeds, cashmere shawls, coffee, grain, spices, sugar, tea, silk and silk goods, saltpetre, and tobacco. The first railway in the East Indies

was that between Bombay and Tanna, opened April 6, 1853. Bombay is now the terminus of the Bombay, Baroda, and Central India railway, and of the Great Indian Peninsula railway, as well as of steamship lines from England. There is telegraphic communication with Calcutta, opened in 1854, and with Falmouth, England, opened in 1870, by means of cables, avoiding all land communications, by way of Aden, Malta, and Gibraltar. As the capital of the province, Bombay is the residence of the governor and of an Anglican bishop. The provincial high court is also held there. Prominent among the institutions of the city is the royal Asiatic society, famous for its successful efforts in behalf of oriental learning. Several missionary establishments are maintained by Europeans and Americans.

BOMBELLI, Raffaele, a Bolognese mathematician of the 16th century. He published in 1572 a treatise on algebra, in which he first attempted the solution of the "irreducible case" in cubic equations. He gave the geometrical solution depending upon the trisection of an angle, which latter problem, he observed, could be reduced to a cubic equation. He was also the first to attempt the extraction of the cube root in the result of Cardan's formula.

BOMBERG, Daniel, a Dutch printer, born in Antwerp, died in Venice in 1549. He printed several renowned editions of the Hebrew Bible, the first of which appeared at Venice in 1518. The Babylonish Talmud and many other Hebrew books were issued from his press in a style of execution so expensive as to ruin him.

BONA (Fr. *Bone*; Arabic, *Beled el-Anib*, town of grapes), a fortified seaport town of Algeria, in the province of Constantine, on the W. coast of the gulf of Bona, 270 m. E. of Algiers; pop. in 1866, 17,841, more than half Europeans. It is built in the form of an amphitheatre in an extremely fertile region, at the foot of a hill, and

tions. Outside the walls, which are flanked with four square towers and pierced by four gates, is the citadel, built by Charles V. in 1535. Its capture by the French, March 26, 1832, was one of the most brilliant achievements of the French invasion. Since 1850 it has been used as a prison of state. Though the harbor is not favorably situated, commerce is active, but less so than formerly, part of it having been diverted to Philippeville since the establishment of that port in 1838. The coral fisheries are extensive. Silks, tapestry, and other articles are manufactured, and the town contains a marble quarry, an iron foundry, and other industrial establishments, and has weekly communication by steam with Marseilles. A marsh, between the town and the junction of the Seibous with two of its affluents near the entrance of the former river into the sea, is productive of malaria, and is supposed to have been the ancient harbor of Hippo Regius, the scanty remains of which town are about 1½ m. S. by W. of Bona. (See Hippo.)

BONA, Giovanni, a Roman cardinal, born in Mondovì, Piedmont, Oct. 10, 1609, died in Rome, Oct. 27, 1674. He was a collaborator in the *Acta Sanctorum*, the author of *Res Liturgicæ*, which is an authority on the service of mass, and of *De Principiis Vita Christiana*, of which French translations appeared in 1693 and 1728. An edition of his works appeared at Turin in 1747-'58, in 4 vols.

BONA DEA (the good goddess), a Roman divinity, sister, wife, or daughter of Faunus. Her worship was secret, performed only by women; and men were not allowed to know her name. Her sanctuary was in a cavern in the Aventine hill, but her festival, which occurred May 1, was celebrated in a separate room in the dwelling of the consul who then had the fasces. No man was allowed to be present, all male statues in the house were covered, and the myrtle was avoided in the decoration of the house with flowers. The wine used at this festival was called milk, and the vessel in which it was kept *mellarium*. After a sacrifice, called *damium*, the wine was drunk and bacchanalian dances were performed. According to Juvenal, licentious abominations marked these festivals. The snake was the symbol of the goddess, indicating that she was regarded as possessing a curative medical power. In her sanctuary various herbs were offered for sale.

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Bona.

has been Europeanized and embellished by the French, who have improved the harbor and in 1858 built new piers. The town is well supplied with churches, schools, and public institu-

BONACCA (formerly called GUANAJA), an island in Honduras bay, Caribbean sea, 30 m. N. of Cape Castilla; lat. 16° 28' N., lon. 85° 55' W. It is the second in size of the group called the

Bay Islands, is about 9 m. long and from 1 to 8 m. broad, and rises to a height of 1,200 ft. The island was discovered by Columbus in his fourth and last voyage, July 30, 1502. The aborigines had made considerable advances in civilization, and carried on an active trade by means of large boats with the mainland of Honduras and Yucatan, and, it is said, even with Jamaica. The Spaniards and afterward the buccaneers harassed them so much that they abandoned the island in 1642, and took refuge on the mainland. The buccaneers fortified the island and held it till 1650, when they were expelled by the Spaniards. In 1742 the English seized Bonacca and the neighboring island of Ruatan, which they fortified and held till it was captured by the Spaniards in 1782. When Central America became independent in 1821 Bonacca and the other islands of the group came under the jurisdiction of Honduras. In 1850 a British naval commander declared them under the sovereignty of Great Britain, and in 1852 the group was constituted by royal proclamation the British "Colony of the Bay Islands." This act, being in contravention of the convention between England and the United States known as the "Clayton and Bulwer treaty," led to an animated controversy between the British and American governments, which was at length settled by restoring the islands to Honduras in 1859.

BONALD. I. *Louis Gabriel Ambroise*, viscount de, a French political writer, born at Le Monna, near Millau-en-Rouergue, Oct. 2, 1754, died there, Nov. 23, 1840. When young he served in the *mousquetaires*. In 1791 he emigrated, and joined the royalist army on the Rhine. Returning to France under Napoleon, he became, with Chateaubriand and Fiévée, editor of the *Mercur*, and after the restoration he was a member of the chamber of deputies, always favoring an absolutist and reactionary policy. In 1823 he was made peer by Louis XVIII., and as one of the secretaries of state presided over the censorship of the press. At the revolution of 1830 he resigned his seat as a peer, and retired from public life. His literary labors were devoted exclusively to establishing the theory of power in society, its origin and extent; and he drew his demonstrations from history, philosophy, religion, and the philological meaning of words. He denied the validity of reason, and recognized absolutely that of authority. But above the highest civil authority, that of legitimate kings, he affirmed that of religion, or the church and its hierarchy. His complete works were published in 12 vols., Paris, 1817-'19, the principal being *La législation primitive, Théorie du pouvoir politique et religieux, Recherches philosophiques, and Mélanges littéraires et politiques*. II. *Louis Jacques Maurice*, a French cardinal, son of the preceding, born at Millau, Oct. 30, 1787, died in Lyons, Feb. 25, 1870. He became archdeacon of Chartres in 1817, bishop of Le Puy in 1823, and archbishop of Lyons in 1839, and

bore for a time the title of primate of the Gauls, which Pius IX. afterward forbade him to retain. He was created cardinal by Gregory XVI. in 1841. He became conspicuous as a champion of the rights of the church against the civil power, and of the liberty of education, for which Lamennais, Lacordaire, Montalembert, and the rest of the young Catholic party were then contending. His controversies with Dupin and Villemain on these subjects were especially vigorous. He was a legitimist in politics, but gave a ready adhesion to the republic of 1848. Under the empire he held a seat in the senate by virtue of his rank as cardinal. In September, 1852, he was created a commander of the legion of honor.

BONAPARTE, or *Bonaparte*, the name of the family which has given to modern France its imperial dynasty. Its early origin is obscure. The name occurs in Corsica as early as the middle of the 10th century, being that of a *messire* who figured as witness to a public document. It disappears, however, in that island, not to reappear until the 16th century. In the mediæval history of Italy a number of Bonapartes are mentioned, but criticism has as yet failed fully to establish or to disprove the pretended connections between their families. We find Bonapartes at Treviso, Florence, Parma, Padua, Ascoli, Bologna, San Miniato, and Sarzana, many of them noblemen of note and ability. A Trevisian Bonaparte, Giovanni, who held a command in the army of the Lombard league against the emperor Frederick Barbarossa, is designated as *consul et rector*. Those of Florence were originally Ghibellines, but subsequently espoused the popular cause. A Nicolò Bonaparte served as papal envoy to various courts about the middle of the 15th century. Jacopo Bonaparte, of Tuscany, is the reputed author of a history of the sack of Rome by the army of the constable de Bourbon (*Ragguaglio storico di tutto l'occorso, giorno per giorno, nel sacco di Roma del anno 1527*), of which a French translation by the ex-king Louis of Holland was published at Florence in 1830. The modern Corsican Bonapartes seem to be chiefly connected with those of Sarzana. They figure among the patricians of Ajaccio in the 16th and 17th centuries. At the middle of the 18th, three male members of that branch were living, one of whom, Carlo, became the father of the founder of the French imperial dynasty, sketches of all the historical members of which are given in the following notices—first of the father and mother of Napoleon, with their daughters, then of their sons in alphabetical order, each followed by the noteworthy members of his family.

BONAPARTE, or *Bonaparte*. I. *Carlo Maria*, father of Napoleon I., born in Ajaccio, March 29, 1746, died in Montpellier, Feb. 24, 1785. He studied law in Pisa, and early acquired prominence as an advocate and a follower of Paoli in the Corsican war against Genoa. In his 18th year he fell in love with Maria Le-

tizia Ramolino, whose family belonged to the Genoese faction, and were adverse to the marriage, which did not take place till 1767. His wife accompanied him during his campaign, and dissuaded him from following Paoli in his flight to England. He afterward entered into friendly relations with Count Marbœuf, the French governor of the island, and became assessor of the city and province of Ajaccio, deputy of the Corsican nobles to the court of France (1777-'9), and in 1781 one of the 12 members of the council of the Corsican nobility. Through the munificence of the government his son Napoleon was admitted to the military school of Brienne, Louis to the seminary at Autun, and his daughter Elisa to the royal institution of St. Cyr. Afflicted with an ulcer in the stomach, he sought medical advice in Montpellier, and died in that city in the presence of his son Joseph and of his wife's brother, afterward Cardinal Fesch. He was a fine-looking, intelligent, amiable, and courageous gentleman. His portrait is in the Versailles museum, and his marble bust by Elias Robert was executed in 1855. His wife bore him 13 children, of whom five sons, Joseph, Napoleon, Lucien, Louis, and Jérôme, and three daughters, Elisa, Pauline, and Caroline, survived him. **II. Maria Letizia** (called by the French Madame LÉTITIA), wife of the preceding, born in Ajaccio, Aug. 24, 1750, died in Rome, Feb. 2, 1836. She was of an austere and classical style of beauty and commanding appearance, and her courageous spirit revealed itself after her marriage, when she went through the ordeal of camp life, in company with her husband, shortly before giving birth to her son Napoleon. She was overtaken with the first pains of labor while at church, and had barely time to reach her home. After the death of her husband she devoted herself to the education of her children; and in 1793, when Corsica fell into the hands of the English, she escaped with her three daughters and Lucien, in the midst of many perils, from Ajaccio to Marseilles, where she lived in penury upon the pittance which the government allowed to Corsican refugees. Her position was greatly improved after Napoleon's promotion to the chief command of the French army in Italy, and on the establishment of the consular government she removed to Paris. Her mode of existence, however, continued to be frugal and unpretentious, even after her son's accession to the throne, when she received the title of Madame Mère. Napoleon found fault with her predilection for Lucien, and afterward with her inveterate dislike of Maria Louisa, and always with her repugnance to display. But though she occasionally suffered from his want of filial affection, he insisted upon the utmost reverence being shown to her. Her education and disposition were not suitable for a prominent position in the brilliant society of Paris; and though a patrician by birth, of great natural dignity of manners, and possessed of consider-

able tact and judgment, her culture was deficient and her tastes were simple, and her habitual circle included only Madame Saveria, the faithful teacher of several of her children, and a few other intimate friends. She saved large sums of money, which afterward enabled her to assist her children in distress; and though economical almost to parsimony, she was lavish in dispensing charities, at the head of which she was placed officially. After the downfall of Napoleon, she went with several of her children to Blois, and then to Rome. She visited her son at Elba, and sternly rebuked Caroline's defection, admonishing her rather to trample upon the corpse of her husband Murat than to desert her brother and benefactor. In April, 1815, she returned to Paris; and after the battle of Waterloo she took up her abode in Rome. Denounced in 1820 as a Bonapartist agitator by M. de Blacas, the French ambassador in Rome, she indignantly repelled the accusation, and declared with an unusual vehemence, the effect of which was enhanced by her general impassibility, that if in reality she could dispose of millions, she would not spend them in such attempts, but would devote her means exclusively to effect the release of her son from St. Helena. In 1830 she broke her thigh, and was ever afterward confined to her room. She left to her children a fortune represented by a revenue of 80,000 francs, and about 500,000 francs worth of jewelry. In the museum of Versailles are two portraits of her, painted by Gérard. In her celebrated statue by Canova she is represented in the attitude of Agrippina in the capitol. **III. Marie Anne Elisa Bacciocchi**, daughter of the preceding, born in Ajaccio, Jan. 3, 1777, died, according to most accounts, at the villa Vicentina, near Trieste, Aug. 7, 1820. She left St. Cyr after the suppression of that educational establishment at the end of 1792, and married at Marseilles in May, 1797, Felice Pasquale Bacciocchi, a poor Corsican officer of noble lineage. In 1798 she removed to Paris, where her house became a resort of Chateaubriand, La Harpe, and other eminent persons, including Fontanes, her special favorite. Napoleon made her in 1805 princess of Piombino and Lucca, and in 1808 grand duchess of Tuscany. She was called the Semiramis of Lucca on account of her administrative talents. She put down brigandage and promoted the prosperity of her small dominions. She lived in great state at Florence, Pisa, and other places till 1814, when she retired to Bologna. Early in 1815 she went to Austria, where after Murat's death she was joined by his widow, her sister Caroline, spending her last years under the title of countess of Compignano, near Trieste, in which city she was buried. Her husband, though crowned with her at Lucca, held a subordinate position during her life. They had two sons. (See BACCIOCHI.) **IV. Marie Pauline**, sister of the preceding, born in Ajaccio, Oct. 20, 1780, died in Florence, June 9, 1825. She had no advantages of education, but

was remarkably brilliant and beautiful. In her 14th year Fréron fell in love with her, and she would have married him if Napoleon had not discovered that his first wife was living. Her next suitor, Gen. Duphot, was killed in Rome in 1797; and Junot applied in vain for her hand, which she bestowed in 1801 upon Gen. Leclerc, whom she accompanied to Santo Domingo. She declined to leave him despite the rising of the negroes and the outbreak of the yellow fever; and after her husband had died of that disease (Nov. 2, 1802), she conveyed his remains to France. Their only child died one year after her second marriage in 1808 with Prince Camillo Borghese, who, being the heir of an illustrious princely family of Rome, was selected by Napoleon as a valuable brother-in-law. He almost immediately separated from his wife, whose virtue he suspected, and he only became reconciled to her in her illness toward the end of her life. Napoleon doted upon Pauline, and made her duchess of Gnasatalla; but he rebuked her excessive jealousy of Josephine, and resented her rudeness to Maria Louisa by banishing her from his court. She nevertheless led a gay life in the vicinity of Paris and subsequently at Nice, gathering round her many fashionable people of easy virtue. The news of her brother's downfall in 1814 reached her in Italy. Forgetting all previous differences, she proceeded to Elba, made many attempts for his restoration, reconciled him with Lucien and Murat, and sent him all her jewelry, which was afterward found in Napoleon's carriage at Waterloo. She repeatedly applied for permission to share his captivity at St. Helena, and spent the rest of her life in great affliction, Napoleon's death giving an irretrievable blow to her shattered health. After a long residence in the Borghese palace in Rome, she joined her husband in Florence shortly before her death. The papal authorities treated her with great kindness, and she endeared herself to the people wherever she was by her patronage of letters and art and by her extensive charities. Canova's marble statue of Pauline (now said to be Queen Victoria's property) represents her as Venus Victrix. Her remains were transferred from Florence to Rome and buried in the Borghese chapel. (See BORGHESSE.) **V. Caroline Marie Annonciade**, sister of the preceding, born in Ajaccio, March 26, 1782, died in Florence, May 18, 1839. She went with her mother to Paris, and was for some time under the tuition of Madame Campan at St. Germain. Murat was one of her many admirers, and Napoleon, over whom she exercised great influence, selected him as her husband. They were married on Jan. 20, 1800, and Murat successively became grand duke of Cleves and Berg (1806) and king of Naples (1808). Superior to her husband in administrative talent, she marked her accession to power as regent in her husband's absence, by recalling political exiles and releasing prisoners of state, and by a felicitous

selection of upright and able ministers. She promoted science, letters, and art, improved the material and moral condition of the Neapolitans, established several lyceums and a female seminary, and had extensive excavations made, especially at Pompeii, which brought to light many remarkable monuments. She also displayed great courage, especially in 1809, when she animated the drooping spirit of her subjects by exposing herself on the quay within reach of the fire of an English fleet. Her domineering nature, however, brought her into collision with Maria Louisa, and Talleyrand described her as a handsome woman with the head of Cromwell. Alienated from the emperor's court, she sided against him by joining her husband's secret negotiations with Austria and England. After the disasters which overwhelmed Murat, she took leave of him May 20, 1815, remained in Naples as regent, and invoked the assistance of English marines and the Austrian squadron for the repression of anarchy. She finally left Naples on board an English vessel in company with three of her former ministers, including Macdonald; on her way to Trieste she met the ship which was conveying Ferdinand, the restored king of Naples, to his capital. The emperor of Austria objected to her residing in Trieste, but permitted her to establish her domicile near Vienna, where she assumed the name of Countess Lipona—an anagram of Napoli or Naples. While here she accidentally learned the tragic end of her husband, after which she contracted a secret marriage with Gen. Macdonald, who had never left her since their departure from Naples. Despoiled of her vast personal property, she was eventually obliged to dispose of her estate near Vienna, and to join her daughters in Italy. Her claims upon the Élysée Bourbon and Neuilly palaces were rejected by France, but an annual allowance of 100,000 francs was granted to her by the chambers shortly before her death. She bore to Murat two sons and two daughters. (See MURAT.)

BONAPARTE. I. Jérôme, king of Westphalia, youngest brother of Napoleon I., born in Ajaccio, Nov. 15, 1784, died at Villegienis, near Paris, June 24, 1860. He was educated at the college of Juilly, entered the army as a private in 1800, and soon afterward joined the naval service in the Mediterranean, and in 1801 the expedition to Santo Domingo, rising to the grade of lieutenant. In 1803, while on his return to France by way of the United States, where he was introduced to President Jefferson, he fell in love with Miss Elizabeth Patterson, the daughter of an eminent and wealthy Baltimore merchant, a young lady of great beauty, then in her 18th year. He deputed the Spanish minister in Washington to solicit her hand, and despite the protest of the French consul and the reluctance of the Pattersons, he married her on Dec. 24, 1803. The contract had been carefully drawn by Alexander J. Dallas, and the ceremony was performed

by the Roman Catholic Bishop Carroll of Baltimore, brother of Charles Carroll. They resided in the United States till March, 1805. While they were on their way to France Jérôme's mother entered a legal protest against the marriage, as contracted by her son during his minority without her consent and without legal publication of the banns in France. This was done at the bidding of Napoleon, who had in vain applied to Pope Pius VII. to cancel the marriage, but had from the first prohibited its registration, declaring it null and void and the prospective offspring illegitimate. The municipal authorities of Paris subsequently issued a decree to the same purport, and Jérôme and his wife were forbidden to enter France. They landed at Lisbon, and Jérôme had an interview with Napoleon at Alessandria, Piedmont, May 6, but without succeeding in reconciling him to his marriage. His wife, who had left Lisbon for Amsterdam, was not permitted to land there, and was obliged to sail at once for England, where in July, 1805, she gave birth to a son. Jérôme had in the meanwhile been permitted to reënter the naval service, and as commander of a French squadron he obtained from the day of Algiers the liberation of several hundreds of French and Genoese captives, whom in August he brought safely to Genoa, despite English cruisers. Napoleon promoted him to a higher command under Admiral Willaumez on an expedition to the French possessions in the West Indies; but being overtaken by a storm, many of the vessels were scattered, the admiral making for American ports. Jérôme remained at his post, and with some of the ships succeeded in destroying several English vessels, and on Aug. 26, 1806, reached with a number of captives a small and almost inaccessible port on the coast of Brittany, having barely escaped capture by the British squadron under Lord Keith. This exploit won for him the rank of rear admiral, but he soon left the naval for the military service with the rank of brigadier general. At the same time he was recognized as a French prince, and subsequently (Sept. 24, 1806) the senate made him successor to the throne in the event of Napoleon's leaving no male issue. He commanded a body of Würtembergers and Bavarians in the Prussian war of 1806-'7, gaining some successes in Silesia, and was rewarded with the grade of general of division, March 14, 1807, and after the peace of Tilsit with the crown of Westphalia, which was erected into a kingdom, with Cassel as capital, Aug. 18. In the same month he married the princess Catharine, daughter of the king of Würtemberg, an alliance forced upon him by Napoleon, though he was much attached to his first wife, and had repeatedly urged the emperor to recognize her. But he never saw her again after her departure for England, excepting, as alleged, casually, years afterward in the picture gallery of the Pitti palace in Florence, when Jérôme started

aside on beholding her, and was overheard to say to Catharine, "That lady is my former wife," after which he left the gallery and departed next morning from Florence. After his accession to the throne of Westphalia, he appointed several learned men as ministers, reopened the university of Halle, emancipated the Jews, and introduced the *Code Napoléon*; but his rule was in other respects marked by shocking levity and prodigality, and politically he was nothing more than the deputy or viceroy of the emperor. In 1809, during the war with Austria, he promptly quelled the insurrectionary spirit in his kingdom, and proceeded with 20,000 troops to Saxony, entering Dresden Dec. 1. In the campaign against Russia, in 1812, he led a corps of Germans, and distinguished himself by bravery; but having been guilty of some neglect which disconcerted the plans of Napoleon, he was severely reprimanded by him, and went home in anger. In October, 1813, when the French were driven from Germany, he went to Paris. He was expelled from France in 1814, and was arrested with his wife by a body of the allies, but they were speedily released. He then went to Switzerland, and afterward resided in Gratz and in Trieste. On learning the emperor's return from Elba he hastened to Paris, became a member of the chamber of peers, and fought at Ligny and Waterloo, displaying a capacity and a bravery which made Napoleon say to him, "*Mon frère, je vous ai connu trop tard.*" He afterward returned to Paris, and the Würtemberg envoy holding out to him the prospect of a cordial reception, he proceeded to that country, but was arrested at the frontier and compelled to sign a convention, the terms of which made him almost a prisoner of the king of Würtemberg; and indeed on his arrival at Göppingen he was treated as such. The château of Ellwangen was assigned to him as a residence, where he remained with his family until about July, 1816, when he was permitted to leave; and on arriving at Augsburg he was surprised by receiving from the king a patent of nobility creating him prince of Montfort, which he returned under protest to his brother-in-law, the crown prince. He then spent some time near Vienna with the ex-queen Caroline, and here they heard of the death of his father-in-law and of his will, by which Jérôme's wife, who had already received her dowry of 200,000 francs, was not provided for beyond her share of 150,000 francs from her mother's estate. Jérôme having been unable to recover 1,200,000 francs which he had deposited with a banker in Paris, and the marquis de Maubreuil having robbed his wife while she was still in France of all her jewelry and of 80,000 francs in money besides, his position became embarrassing; and toward the close of 1819 he could hardly defray his travelling expenses on his way to Trieste for the restoration of his son's health. In the following year, however, he obtained judgment against his Paris

banker. He resided in Rome till 1831, when he removed to Florence, and afterward to Lausanne, where his devoted and accomplished wife died, Nov. 28, 1835. At the end of 1847 he was permitted to reside in Paris, and after the revolution of February, 1848, he was restored to his military rank and appointed governor of the Invalides (Dec. 23) and marshal (Jan. 1, 1850). In January, 1852, he became president of the imperial senate, but retired toward the end of that year, after delivering a remarkable speech on the restoration of the empire. The *palais royal* and the palace of Meudon were placed at his disposal, the right of succession to the throne was accorded to him and to his son, and he presided occasionally over cabinet councils in place of the emperor. He died from a pulmonary inflammation, which had prostrated him since December, 1859, and was buried with great pomp in the church of the Invalides.—Jérôme's surviving first wife, Madame Patterson, as she was called in France, having spent several years in Europe in unavailing efforts for the legal recognition of her marriage, has ever since resided as Mrs. Patterson-Bonaparte in Baltimore, where she is much respected; and though smarting under an irretrievable wrong, she never ceased to cherish the memory of the husband who deserted her. She was engaged in 1872 in completing her autobiography. **II. Jerome Napoleon**, only child of the preceding by his first wife, born at Camberwell, England, July 7, 1805, died in Baltimore, June 17, 1870. He was educated in Europe and the United States, and graduated at Harvard college in 1826. He studied law, but never practised, and in early life married Miss Susan Mary Williams, daughter of an opulent citizen originally of Roxbury, Mass. She brought him a large fortune, which in addition to his own property made him one of the richest men of Baltimore; and he devoted himself to the management of his estate and to agricultural pursuits. He received a handsome allowance from his father, with whom he was on terms of intimacy in his several visits to Europe. Louis Philippe permitted him to reside for a short time in Paris, but only under the name of Patterson; yet he attracted much attention by his striking likeness to his uncle Napoleon. In 1852 a family council decided in favor of his assuming the name of Bonaparte; but without being regarded as belonging to the imperial family; and at the invitation of Napoleon III. he several times visited him in Paris with his son. After his father's death in 1860, the Patterson claim was again brought before the French courts; but, although Berryer pleaded the cause, the decision in 1861 was again adverse to the recognition of Jerome as the legitimate son of the king of Westphalia. Mr. Bonaparte never became naturalized in the United States, and proudly called himself a French citizen.—His only son, **JEROME NAPOLEON**, born in 1832, a graduate of West Point

(1852), became an officer in the French army in 1854, and served in the Crimea, Algeria, Italy, and France till the fall of the empire. He then returned to the United States, and in 1872 he married at Newport, R. I., a lady of Boston. **III. Jérôme Napoleon**, son of King Jérôme by his second wife, Catharine of Würtemberg, born Aug. 24, 1814, died in Florence, May 12, 1847. He was an officer in the Würtemberg army till 1840, when ill health compelled his retirement. **IV. Napoleon Joseph Charles Paul**, popularly known as Prince Napoleon, second son of Jérôme and Catharine of Würtemberg, born in Trieste, Sept. 9, 1822. His education, commenced in Rome, was completed in Geneva and at Arenenberg, where his cousin, the future Napoleon III., was his tutor. His uncle, the king of Würtemberg, provided for his military training at Ludwigsburg, and after remaining here for four years he travelled extensively and spent some time in Spain. His resemblance to the first Napoleon attracted attention everywhere, and Béranger describes him, in allusion to his obesity, as a genuine Napoleon medal dipped in German fat (*une vraie médaille Napoléonienne trempée dans de la graisse allemande*). A permission granted him by Louis Philippe in 1845 to reside in Paris was withdrawn after four months, mainly in consequence of his alleged understanding with revolutionists; but in 1847 he was allowed to remain in France with his father, and he made himself conspicuous on Feb. 24, 1848, by his eager support of the revolution. In 1848 he was elected deputy from Corsica to the constituent assembly, and in 1849 from the department of the Sarthe to the legislative assembly. The less liberal complexion of the latter body induced him to accept from Louis Napoleon the mission to Spain; but he had hardly reached Madrid when, on hearing of the reactionary educational measures proposed by Falloux, he hastily returned to the assembly, and was deprived of his office as minister for having deserted his post. He now became noted for his violent opposition, and was called *le prince de la Montagne*. In 1850, when Thiers applied the term *vile multitude* to those who were to be disfranchised, he vindicated popular rights in an inflammatory speech; but he kept quiet for a time after the *coup d'état* of Dec. 2, 1851. On the establishment of the second empire in 1852 he took his seat in the senate and council of state as an imperial prince, with the right of succession to the throne. At the same time he was made general of division, though he had never seen military service; and at the opening of the Crimean war he was placed in command of a reserve corps at the Alma and at Inkerman. He was soon recalled, ostensibly on account of ill health. His adversaries questioned his bravery and capacity, while his partisans ascribed his abrupt return to civil life to his having insisted with characteristic vehemence upon using the war against Russia for the liberation

of Poland. He displayed considerable talent and activity as president of the imperial commission of the exposition of 1855, and in a scientific maritime excursion to the coasts of Scotland, Iceland, and Greenland in 1856, and was admitted to the academy of fine arts. In 1857 he acquitted himself successfully of a diplomatic mission by prevailing upon Prussia to relinquish her claims upon Neufchâtel in favor of Switzerland, putting an end to that contest. In 1858 he was appointed to the newly created ministry of Algerian and colonial affairs, and held that office about nine months. His marriage on Jan. 30, 1859, with the princess Clotilde, daughter of King Victor Emanuel, was speedily followed by the Franco-Italian war against Austria, during which he was sent to Tuscany at the head of the fifth army corps; but though he crossed the Apennines by forced marches, he reached headquarters only to witness the conclusion of the preliminary treaty of peace of Villafranca, for the carrying out of which he was sent to Verona. In 1861 he went with his yacht to the United States, and leaving the princess Clotilde with the duchess d'Abrantès at New York, proceeded to Washington, where Secretary Seward presented him to President Lincoln. He then visited Beauregard's headquarters at Manassas, and pushed as far as Richmond, escorted by the French minister Mercier. He was accompanied by Maurice Sand, the son of his intimate friend Mme. Dudevant (George Sand), and others; and he often expressed his sympathies with the cause of the Union and of slavery abolition. After his return he made in 1862 and 1863 remarkable speeches in the senate against the temporal power of the papacy and in favor of Polish nationality. In 1863 he visited the Suez canal, of which enterprise he became an advocate. At the inauguration of the statue of Napoleon I. in Ajaccio in 1865, he made a sensational oration, full of democratic sentiments, which proved still less palatable than his previous speeches to the emperor, who was then in Algeria, and from thence addressed an official reprimand to the prince. The latter immediately threw up all his public functions, including his membership of the council of regency, his opposition to the temporal power of the pope having converted the empress Eugénie, who had never been his friend, into his inveterate enemy. But he speedily regained the confidence of the emperor, who apparently regarded his vagaries as harmless, and even in some respects as useful. In 1868 he visited the North German states, and a political object was ascribed to this as to his other journeys in that year, especially as he occasionally received official deputations and was fond of assuming the attitude of a sovereign prince. Though he constantly coquetted with the ultra radicals, they never ceased to regard him as in reality an imperialist, possibly desirous of supplanting his cousin; while the emperor himself even refrained from rebuking his renewed violence in

1869, though his speech on that occasion was publicly disavowed by Rouher, president of the senate. Prince Napoleon had long been nick-named Plon-Plon, his ambition as well as his attempt to reconcile imperialistic with extreme liberal institutions subjecting him to criticism, to which the grotesque contrast between his impetuous demonstrations and placid appearance added a tinge of the ridiculous. After the outbreak of the Franco-German war, he made unavailing efforts to draw Italy into the contest against Prussia, and at the close of 1871 he declined to accept an election to the general council of Corsica. In October, 1872, he was ordered to leave Paris, and on his resisting he was forcibly expelled. The prince instituted legal proceedings against the prefect and commissary of police who arrested him in the house of his friend M. Richard, claiming 200,000 francs damages. He afterward returned to his château of Prangins near Geneva with his wife and children, consisting of two sons, born in 1862 and 1864, and a daughter, in 1866. They occasionally reside also in their mansion at Milan. **V. Mathilde** *Luettia Wilhelmine*, sister of the preceding, popularly known as Princess Mathilde, born in Trieste, May 27, 1820. She was early distinguished by her literary and artistic tastes, and in 1841 married in Florence the Russian count Anatol Demidoff, whom the grand duke of Tuscany made prince of San Donato. He having agreed to bring up the prospective children in the Roman Catholic faith, the emperor Nicholas deprived him of his office of chamberlain. But they had no issue, and when Mathilde went to St. Petersburg the czar became her friend, and he corresponded with her till the Crimean war; and on her separation in 1845 from her husband, he insisted upon his settling on his wife an annuity of 200,000 rubles. The princess Mathilde presided over the household of Louis Napoleon previous to his marriage with Eugénie, and afterward continued to occupy a prominent position at the imperial court until the Franco-German war, when the downfall of her cousin deprived her of her large endowments; and the death of her former husband in April, 1870, also cut off the income which she had derived from him. Her palace in Paris and her summer residence at St. Gratien, near the lake of Enghien, were the most distinguished literary and artistic centres of the second empire; and she excels as an artist, as is attested by her fine paintings and etchings. After the death of Sainte-Beuve in 1869, the newspapers engaged in a lively controversy about her letters to him; and her special favorite was Théophile Gautier, whose funeral she attended in October, 1872, President Thiers having permitted her to continue to reside in Paris.

BONAPARTE, Joseph, successively king of Naples and of Spain, eldest brother of Napoleon I., born at Corte, Corsica, Jan. 7, 1768, died in Florence, July 28, 1844. The grand duke of Tuscany having recommended Charles Bonaparte

to his sister, the queen of France, he gained admission for his son Joseph to the college of Autun, destining him for the church. Joseph, however, agreed with Napoleon to become a soldier; but the father prevailed upon him shortly before his death to relinquish this project, and to devote himself to the task devolving on him as the eldest son of attending to the education and prosperity of his younger brothers and sisters. Joseph having completed his education at the university of Pisa, the grand duke of Tuscany wished to attach him to his service, but he preferred to rejoin his family in Corsica. In June, 1788, he was admitted as advocate to the superior council at Bastia, and he became one of the most active and influential members of the municipality. He was an early and zealous supporter of the French revolution of 1789, became president of his district, published a pamphlet on the new French constitution, was a member of the committee appointed to invite Paoli to Corsica, and became his secretary in the Corsican administration. During the English invasion of the island Joseph, who had been commander of militia, served at Toulon at the same time with his brother Napoleon. On Aug. 1, 1794, he married at Marseilles Marie Julie Clary, daughter of a rich merchant, and whose younger sister became in 1798 the wife of Bernadotte and afterward queen of Sweden. In 1796 he followed Napoleon to Italy as military commissary of his army, and was sent by him to Paris with Junot to deliver his trophies to the directory. Shortly afterward he was sent with a body of men to Corsica against the English; but they having evacuated the island before his arrival, he rejoined Napoleon, who procured for him the appointment of French envoy in Parma, which he exchanged in 1797 for that of French minister in Rome. His course during the commotions in that city in 1798 being approved by the directory, the mission to Berlin was tendered to him; but he preferred joining the council of 500 as member elect from Corsica, his presence in Paris enabling him to watch over the interests of Napoleon, to whom he sent his Greek friend Bourbaki to urge his immediate return from Egypt. He coöperated with Napoleon in the events of the 18th Brumaire, introducing Moreau to him, and through the medium of Cabanis making the first overtures to Sieyès. He declined a place in the cabinet, but accepted a seat in the tribunate and in the council of state, and contributed essentially to the popularization of the new consular government by assisting Napoleon with his advice, and by rallying round him many supporters, his amenity of manners and conciliatory disposition making friends for him in almost all classes of society. The same characteristics secured his success as the negotiator of the treaty of peace with the United States in 1800, with Germany at Lunéville in 1801, and with Great Britain at Amiens in 1802; and subse-

quently in concluding the concordat with the Roman see. When assuming the imperial dignity, Napoleon offered the crown of Lombardy to Joseph, who however preferred to remain in France as the presumptive successor to the new throne. In 1806 he was prevailed upon by his brother to accept a military position; but as the latter had to leave for the seat of war, Joseph remained in Paris to share with Cambacérès in the administration of the government. After the victorious return of Napoleon from Ansterlitz, Joseph was sent with an army to Naples, entering the city in February, 1806, and assuming the title of king of Naples, according to the wishes of Napoleon, which had now become laws even for Joseph, to whom up to that time he had invariably shown great deference. The cares of the throne were not congenial to Joseph's quiet disposition; and they were made the more harassing by the futile attempts to conquer Sicily and by other internal complications, and especially by the interference of his brother with his conciliatory measures. Yet he became attached to the genial climate and to the people of Naples; and after having reigned over them about two years with great mildness and with much solicitude for their prosperity, it was with reluctance, and only in obedience to his brother's inexorable will, that in 1808 he exchanged the throne of Naples for that of Spain. In an interview with Napoleon at Bayonne, Joseph insisted upon being recognized as king by the Spaniards previous to his departure for their country, and Napoleon at once had a junta convened (June 15), which lost no time in giving the prescribed recognition. The new monarch left for Madrid, but a day after his arrival there (July 20) he informed Napoleon of his deception and of the unconquerable hostility of the Spaniards. If left to himself, he might perhaps have made his rule acceptable to them; but he was compelled to govern Spain, as he had been to govern Naples, not in the interest of the nation, but according to the dictates of Napoleon, who disdained to listen to Joseph's repeated remonstrances, suggestions, and entreaties; neither would he allow him to relinquish the throne, though Joseph wished to be relieved from its burdens. Three times during his administration of five years he was driven by hostile armies from his capital, the last time, in 1813, never to return. After transferring (July 12) the command of the army to Soult, Joseph retired to a château near Bayonne, and soon afterward he rejoined his family at Mortfontaine, near Paris. On Dec. 29 he wrote to Napoleon placing himself at his disposal, but yet expressing unwillingness to desert his duties as king of Spain. The emperor in January, 1814, made him lieutenant general of the empire in his absence, with large military and civil prerogatives as the head of the regency under Maria Louisa. In this capacity, when the allied army invested Paris in March, 1814, he authorized Marmont and

Mortier to treat for a suspension of hostilities, and subsequently consented to a capitulation. He then joined Maria Louisa and her son at Blois, attempted in vain to rejoin Napoleon at Fontainebleau, and went to Switzerland, where he purchased the château of Prangins on the lake of Geneva. On hearing of the emperor's landing at Cannes, Joseph hastened to Paris, and endeavored to gain the support of Lafayette, Mme. de Staël, Benjamin Constant, and his other personal friends, for his brother's last desperate attempt at restoration, by holding out the promise of a constitutional form of government. After the battle of Waterloo he met Napoleon for the last time, June 29, 1815, and in vain proposed to take his place as prisoner, by passing himself off for him. Napoleon still hoping to be able to escape to the United States, the two brothers pledged themselves to meet there. While the emperor was conveyed to St. Helena, Joseph embarked at Royan, July 25, under the name of Count de Survilliers, for New York. He purchased a house in Philadelphia, where he lived during the winter, and extensive grounds and a mansion called Point Breeze, near Bordentown, N. J., where he generally spent his summers. An act was passed in 1817 by the legislature of New Jersey to enable him, as an alien, to hold real estate; and at his request a similar act was passed in 1825 by the state of New York, where he resided some time in a secluded mansion on the edge of the great northern wilderness. He endeared himself to Americans by his benevolence, affability, and accomplishments; and he was elected to many philanthropical and learned associations. His wife was prevented by her delicate health from joining him; but his two daughters and his son-in-law, the prince of Canino, lived with him in the United States. Among his other faithful companions was O'Farrell, formerly one of his ministers in Spain. His exile was cheered by the visits of Lafayette and other distinguished personages, but it was deeply saddened in 1821 by the death of Napoleon, to whom Joseph had never ceased to be tenderly devoted. As chief of the Bonaparte family, he ineffectually exerted himself after the revolution of July, 1830, for the recognition of the claims of Napoleon II. to the throne of France, and protested against the accession of any other dynasty. In 1832, on hearing of the duke of Reichstadt's illness, he went to Europe; but being informed of his death at Liverpool, he remained in England. In 1834 he joined his brother Lucien in a protest against the banishment of their family from France, disclaiming all unpatriotic and ambitious designs, and declaring their submission to the popular will. In 1837 he returned to the United States, but in 1839 again went to England. Some time after his second arrival in London he was struck with paralysis, and sought relief in vain at Wildbad, Würtemberg. In order to escape from the English climate and to rejoin his family, he wished to proceed

to Italy. Even in 1841, however, he could only obtain the consent of the king of Sardinia to his residing in Genoa; but this example was soon followed by the grand duke of Tuscany, and he spent the rest of his life with his family in Florence. Joseph was not made for camps or thrones; his ambition was moderate, and he found the main sources of happiness in domestic and social life, and in the gratification of his literary and artistic tastes. His presence was elegant and courtly, and his manners were singularly winning. The correspondence between himself and Napoleon I., which has been published since his death, reveals the confidential intercourse of the two brothers, and throws considerable light upon the details of important events and transactions. Joseph presented the various insignia of the legion of honor which had been worn by Napoleon to the French government, and many pictures from the collection of his uncle Cardinal Fesch to Corsican towns. The museum of Versailles contains a marble statue of Joseph, by Delaistre; a bust, by Bartolini; and a portrait of him by Gérard. See *Mémoires et correspondance politique et militaire du roi Joseph*, by Du Casse (10 vols., Paris, 1853-'5; an English selection from the same, 2 vols., New York, 1856), and *Mémoires*, by Miot de Melito (8 vols., Paris, 1858).—His wife died in Florence, April 7, 1845. Their elder daughter, ZÉNAÏDE CHARLOTTE JULIE, married her cousin the prince of Canino, and died in Italy in 1854. The younger daughter, CHARLOTTE, born in Paris, Oct. 31, 1802, married her cousin, the second son of Louis, had no children, became a widow in 1831, and died at Sarzana, Italy, March 2, 1839.

BONAPARTE. I. Louis, king of Holland, third brother of Napoleon, born in Ajaccio in September, 1778, died in Leghorn, July 25, 1846. Napoleon wished him to study military science at Châlons, but this project was not carried out, and he subsequently served under his brother in Italy and Egypt, and displayed bravery in various engagements, especially at the battle of Arcole. He coöperated with Napoleon on the 18th Brumaire, and rose to the rank of colonel. He was in love with a schoolmate of his sister Caroline, and consented with great reluctance, at the urgent request of Napoleon and Josephine, to marry Hortense, Josephine's daughter. (See BEAUAIRNAIS.) Hortense was equally indifferent to the alliance, which proved unhappy. In 1804 he was made general and councillor of state, and after the establishment of the empire he became prince and constable, governor general of the transalpine departments, and military commander of Paris as successor of Murat, who took the place first destined to Louis at the head of the reserve in the proposed expedition against England. Against the wishes of Louis, the crown of Holland was forced upon him by Napoleon, and he was proclaimed king at Saint Cloud, June 5, 1806. Napoleon, in replying to the Dutch admiral Verhuel's discourse on that occasion,

intimated to Louis that, although king of Holland, he should never cease to be a Frenchman; but Louis after his accession to the throne proposed to devote himself exclusively to the interests of his kingdom, and hence arose interminable difficulties with Napoleon. Louis promoted science, letters, art, the construction of canals and dikes, a vast system of drainage, and various other ameliorations. He resisted Napoleon's design of converting the Dutch army and nation into tools for his conquests and ambition. But while Louis lost no opportunity to propitiate Holland, Hortense sided with Napoleon, and otherwise gave Louis serious cause for deploring their ill-fated union, though she imparted brilliancy to the court of the Hague. The death of their first-born child, Napoléon Louis Charles, in 1807, increased his unhappiness. In the autumn of that year he became altogether estranged from his wife, and she went to Paris, where on April 20, 1808, she gave birth to the future Napoleon III. Louis transferred his capital from the Hague to Utrecht, and eventually to Amsterdam. His relations with Napoleon became still more embittered by the injury which the blockade against England inflicted upon Dutch commerce. Louis resisted this measure as long as possible, and upon finally submitting to it he closed the Dutch ports not only against English but all foreign shipping. The emperor charged him with playing into the hands of England, and allowing Holland to be used as a neutral ground for his enemies. Louis had a stormy interview with Napoleon in Paris in December, 1809; and during his residence in that city he was almost reduced to the condition of a prisoner, the emperor insisting upon regarding Holland as a sort of French dependency, and preventing Louis from returning to his kingdom. On the latter's taking measures to baffle the occupation of Amsterdam by French troops, Napoleon threatened him with the annexation of Holland. Finally he was compelled to yield so far as to interdict all commercial relations with England, to withdraw the privileges granted to the Dutch nobility, and to organize a powerful navy and army to support France against England in case of need. After assisting at Napoleon's marriage with Maria Louisa, having been previously obliged to sanction his divorce from Josephine, Louis returned to Amsterdam in April, 1810, by way of Aix-la-Chapelle; while Hortense, ordered by the emperor to resume her position as queen, took the direct route to Holland, but remained only for a short time, Louis taking little or no notice of her departure. Having been compelled to ratify, though only conditionally, a treaty signed by Admiral Verhuel, authorizing small French garrisons in several localities, and his subsequent protests against Napoleon's increasing usurpations in Holland proving unavailing, he was finally obliged to abdicate in favor of his eldest surviving son Napoléon Louis, appointing Hortense as regent, and left Amsterdam July 1, 1810, a short time before

the annexation of Holland to France. But he never ceased to protest against this measure, and to assert his claims and those of his family to the Dutch throne. He took up his residence at Teplitz, July 9, under the name of Count St. Leu. Resisting Napoleon's order, conveyed to him through Decazes, to return to France, he left for Gratz, and on Dec. 80 declined the estates offered to him by the senate in compensation for his throne, and also forbade Hortense to accept the endowment. In August, 1813, after the outbreak of war between France and Austria, he left the latter country for Switzerland, having repeatedly but in vain applied to Napoleon for the restoration of his kingdom, the emperor finally declaring that he would rather see the house of Orange restored than his brother. Louis made an unsuccessful effort to be reinstated by the people of Holland during their war of independence, and afterward went to Paris. Napoleon received him coldly, and did not wish him to reside in the capital unless he would relinquish all ideas of dominion in Holland, and would sustain his own power, in which case he would be acknowledged as a French prince and constable of the empire. Louis nevertheless remained in Paris, maintaining his pretensions with characteristic obstinacy, and was the only one of Napoleon's brothers who durst defy him to the last. After the overthrow of the emperor in 1814, he joined Maria Louisa, who had left Paris against his advice; the allies permitted him to reside in France, but he would not witness the humiliation of his country, and went to Lausanne. Hortense having obtained from Louis XVIII., through the medium of the czar Alexander, a grant of the domain of St. Leu, with the title of duchess, Louis spurned the king's letters patent, issued May 30, 1814, which raised St. Leu to a duchy; and he also scorned to accept his share of the annuity of 2,500,000 francs which the treaty of Fontainebleau had provided for him and the other princes of the Bonaparte family. His protest to that effect was published at Aarau on Aug. 2, 1814, and soon after he left Switzerland for Rome. Hortense refusing to surrender the custody of their son Napoléon Louis, he was obliged to have recourse to the tribunal at Paris, which conceded this right to him March 7, 1815; after which he retired to Florence with the young prince, who died at Forli in 1831. His health, affected by this and other sorrows, was soon hopelessly impaired by apoplectic fits, which culminated in partial paralysis. The abortive attempts of his youngest son Louis Napoléon at Strasburg (1836) and Boulogne (1840) became new sources of chagrin. He implored his personal friends among the members of the French cabinet to intercede with Louis Philippe not to deprive him of his son's society during the last moments of his life. But the king insisting upon guarantees which the captive prince would not give, Louis despaired of seeing him again. When he was apprised of his

escape from Ham, though in a dying condition, he hastened from Florence to Leghorn to meet him, but arrived only to be informed of his son's inability to procure a passport from England for Italy. This disappointment brought on a fit from which he died, unattended by any member of his family. He was buried in the church of Santa Croce, and his remains were subsequently transferred to the church of St. Leu in Paris. Despite his life-long difficulties with Louis, the emperor gave precedence in his will to his children over those of Joseph and Lucien in the right of succession, and also pardoned him for what he denounced as libellous assertions in the *Documents historiques et réflexions sur le gouvernement de la Hollande* (3 vols., Paris and London, 1820), the most important publication by Louis, and which throws much light upon his and Napoleon's career. He was also the author of several volumes of poetry, of a novel descriptive of Dutch life and manners (*Marie, ou les peines d'amour*, 3 vols.; 2d ed., under the title of *Marie, ou les Hollandaises* 1814), and of a *Mémoire sur la versification* (Paris, 1814), which obtained from the institute a prize offered by himself for the best essay on versification. He afterward enlarged this work (2 vols., Rome, 1825-'6), adding adaptations of *Ruth et Noëmi*, an opera, *Lucrèce*, a tragedy, and Molière's *L'Avare*, as specimens of Greek and Latin forms of versification which he wished to see adopted in French poetry. His other writings include *Histoire du parlement anglais depuis son origine jusqu'en l'an VII.*, with autograph notes by Napoleon (Paris, 1820); *Réponse à Sir Walter Scott sur son Histoire de Napoléon* (1828-'9); and *Observations sur l'Histoire de Napoléon par Norvins* (1834). The last surviving son of Louis and Hortense was the late emperor Napoleon III. (See BONAPARTE, NAPOLEON III.)

II. Napoléon Louis, second son of the preceding, born in Paris, Oct. 11, 1804, died in Forlì, Italy, March 17, 1831. He was the first of the Bonaparte princes whose name was inscribed on the official records; he was baptized by Pope Pius VII., and Napoleon I. and Madame Lætitia were his sponsors. The death of his brother made him heir presumptive to the Dutch throne, and while Hortense was regent he was for a short time recognized as king of Holland. The emperor made him in 1809 grand duke of Cleves and Berg, and his mother had him educated by the abbé Bertrand. In conformity with the decisions of the tribunals, he was subsequently taken away from her to join his father in Italy. In 1827 he married his cousin Charlotte, the younger daughter of Joseph, ex-king of Spain. He became an ardent liberal, and during the revolutionary outbreak of 1831 he and his brother Louis Napoléon organized the defensive operations of the Italian patriots on the line from Foligno to Civita Castellana, and were about to seize the latter fort and set free the prisoners of state detained there, when their parents dissuaded them

from compromising the Italian cause by giving to the French a pretext for deserting it. They went thereupon to Bologna, and when that city was occupied by the Austrians, they removed to Forlì, where Prince Napoléon Louis died of the measles. He was noted for his scientific attainments and his mechanical inventions. He established a paper manufactory on a plan of his own, published an essay on balloons, translated into French the "History of the Sacking of Rome," by his reputed ancestor Jacopo Buonaparte (Florence, 1829), and published some other writings.

BONAPARTE. I. Lucien, prince of Canino, second brother of Napoleon, born in Ajaccio, March 21, 1775, died in Viterbo, June 29, 1840. He attended with his brother Joseph the college of Autun for nearly two years, and afterward studied at the military school of Brienne and at the seminary of Aix in Provence. He then lived some time with his uncle, the future cardinal Fesch, and in 1792 returned to Corsica. Lucien was an ardent supporter of the revolution, and Paoli called him his little Tacitus. After Paoli's rupture with France in 1793 Lucien abandoned him, and went at the head of a deputation to Paris to solicit assistance against him and against the English. Subsequently he became connected with the commissary department at St. Maximin, and exerted much influence in that little town, as president of the popular society and the revolutionary committee, in preventing political excesses. He was nevertheless arrested after the fall of Robespierre, while he was acting as military inspector in the vicinity of Certe, and released only after six weeks' imprisonment through Napoleon's influence with Barras, who subsequently appointed him commissary of war. About the same time he married a poor girl of Provence. In 1798 he was elected deputy to the council of 500, of which he became president after Napoleon's return from Egypt. Having been a prominent supporter of the constitutional reforms projected by Sieyès, he aided in securing his coöperation for the *coup d'état* of the 18th Brumaire, and was one of the most active in its execution. During the stormy scenes in the council of 500 he left the chair under the protection of Napoleon's grenadiers. He was appointed by the first consul to the newly created senate, but at his request he became minister of the interior as successor of Laplace, who took Lucien's seat in the senate; and the administrative centralization of France was initiated during his tenure of office. He reestablished the official organ, the *Mercure de France*, and promoted letters and arts; but he was too independent to suit his brother, and his relations with him became still more embittered through Fouché, who taunted Lucien with his improvident course and with his illicit relations with the actress Mézerei, and falsely charged him with conspiring against the first consul. Lucien was removed from the ministry and sent as ambassador to Madrid. Here he ingratiated

himself with Godoy and Charles IV., and in March, 1801, secured the alliance of Spain with France in the attack upon Portugal. But he subsequently allowed himself to be outwitted by Godoy, incurring the censure of Napoleon, who charged him with having played into the hands of England, but ordered him to remain in Spain till after the conclusion of the treaties of Badajoz and Amiens, although Lucien had at once tendered his resignation. On his return to Paris, early in 1802, he became a member of the tribunate. He supported the conclusion of the concordat, and aided his brother in being made consul for life. Elected as the deputy of the tribunate to the grand council of the legion of honor, of which he was one of the founders, he became in this capacity an *ex officio* member of the senate. The institute was reorganized and enlarged under his auspices, and both he and his second wife, whom he married in 1802, were popular in literary and general society; but this alliance was so displeasing to Napoleon that Lucien, who never sacrificed his dignity and independence, broke off all relations with him and left France in the spring of 1804. He went to Milan, then to Pesaro, and eventually took up his residence in a magnificent palace in Rome, devoting himself to literary and archaeological labors, in which he became so much absorbed that Count Miot, charged by Napoleon in 1806 to offer a crown to Lucien if he would repudiate his wife, did not even venture to broach the subject. In December, 1807, Napoleon sought an interview with him at Mantua, and offered him a crown, the hand of the prince of Asturias for his daughter, and a duchy for his wife, provided he would divorce her. But Lucien spurned these tempting offers, and deemed it prudent to leave Rome in view of the emperor's increased exasperation, and to reside on his extensive estate near Viterbo, which the pope converted for his benefit into the principality of Canino. Lucien felt even here insecure against Napoleon, and embarked at Civita Vecchia Aug. 1, 1810, for the United States; but he was captured by an English cruiser and conveyed to Malta, and thence to England. Though Lucien was not connected with the empire, and Napoleon even had his name struck out of the imperial almanac, he was treated as a prisoner and detained at Ludlow castle, Wales. Shortly afterward, however, he was allowed to reside at Thorngrove, Worcestershire, where he remained till April, 1814, when he returned to Rome. As soon as he was apprised of the emperor's banishment to Elba, he became as generous to him in his adversity as he had been vehement in opposing his tyranny in his prosperity, and assisted him during the hundred days. After spending some time with his friend Mme. de Staël in Switzerland, he took up his official residence in the *palais royal* as an imperial prince; but the chamber of peers declined admitting him as such, recognizing him only as an ordinary member. He was installed among the

members of the government upon the emperor's departure for Waterloo. After the fatal issue of that battle his appeals to the chambers in favor of the preservation of the empire proved unavailing, and Lafayette gave him a crushing reply by referring to the vast hosts sacrificed to the emperor's ambition. He in vain advised his brother to dissolve the chambers, and on his second abdication he insisted upon his transferring the throne to Napoleon II., whose claims he also vindicated in the senate. He remained with Napoleon till the end of June, and subsequently twice proposed to share his captivity in St. Helena. Going to Italy, he was arrested at Turin, and released after three months on the intervention of the pope, to whose dominions he returned, to devote himself in his villa Russinella, near Frascati, to literary and archaeological labors. Béranger applying to him for assistance in 1808, Lucien immediately placed at his disposal his annual income from the academy, and the poet expressed his gratitude in the preface to his songs of 1833; but Lucien was excluded from the academy after the restoration, though he had been one of its benefactors. He published a description of his famous collection of Etruscan antiquities, and his other works include a novel, *La tribu indienne, ou Edouard et Stellina* (2 vols., Paris, 1799), which was translated into English and German; *Charlemagne, ou l'Eglise déliée* (2 vols., London, 1814; English translation by Butler and Hodgson), and other poems; *La vérité sur les Cent Jours* (Paris, 1835); and his *Mémoires*, of which the first volume appeared in 1836, and an extract of the second volume was published by his widow in 1845 under the title, *Le 18 Brumaire*.—Lucien's first wife, CHRISTINE ELÉONORE BOYER, daughter of a hotel proprietor, died in Paris, May 14, 1800. She bore him two children: CHARLOTTE, born May 18, 1796, married in 1815 Prince Mario Gabrielli, and in 1842 the Roman physician Centamori, and died in Rome May 6, 1865. CHRISTINE ÉGYPTA, born in Paris, Oct. 19, 1798, married in 1818 the Swedish count Arved Posse, and in 1824 Lord Dudley Coutts Stuart, and died in Rome in May, 1847. Lucien's second wife (1802) and previous mistress was MARIE ALEXANDRINE CHARLOTTE LOUISE LAURENCE DE BLESCHAMP, who was divorced from her first husband, the wealthy stock broker Joubertson. She was an amiable and accomplished woman, and published a poem, *Batilda, reine des Francs* (Paris, 1820). She bore him four daughters and four sons. Of the former, JEANNE died shortly after her marriage with Count Honorati; MARIE married Count Vincenzo Valentini, who died in 1858; CONSTANCE became abbess of the convent of the Sacred Heart in Rome; and LÆTITIA, born in Milan, Dec. 1, 1804, was the wife of Sir Thomas Wyse, for many years British ambassador in Athens, became a widow in 1862, and died March 15, 1871. One of her two daughters became in 1862 the wife of the Hungarian

general Türr, and the other, MARIE, after the death of her first husband, Prince Solms, in 1862, contracted a second marriage in 1863 with the Italian statesman Ratazzi. (See RATAZZI.) II. Charles Lucien Jules Laurent, prince of Canino and Musignano, a naturalist, son of the preceding, born in Paris, May 24, 1808, died there, July 29, 1857. He was educated in the universities of Italy. In 1822 he married at Brussels his cousin Zénaïde, the daughter of Joseph, ex-king of Spain. He joined his father-in-law in Philadelphia, and gained a high reputation as an ornithologist, which was increased by his subsequent labors after his return to Italy in 1828. On the death of his father in 1840 he inherited his princely titles, but continued to devote himself exclusively to scientific pursuits till 1847, when he touched upon politics at the scientific congress of Venice, and was expelled by the Austrian authorities. After a visit to London and Copenhagen he went to Rome, where he supported Pius IX. as long as he adhered to a progressive policy; but when the pope changed front and was eventually driven to Gaeta, the prince of Canino became a prominent leader of the revolutionists, was a member and vice president of the constituent assembly, and gallantly upheld the cause of the republic until the occupation of Rome by French troops, July 8, 1849, after which he left for France. Despite the warning given him at the frontier, he continued his journey toward Paris, and was arrested at Orleans by order of Louis Napoleon and conveyed to Havre, whence he sailed for England. In 1850, however, he was permitted to reside in Paris, where in 1854 he became director of the *jardin des plantes*. He was the founder and president of many scientific congresses in Italy, lectured before them on natural history, and was elected member of the academies of sciences of Upsal and Berlin, and correspondent of the French institute. He wrote extensively on American and European ornithology and other branches of natural history. Many of his writings are contained in academical annals and other periodical publications. His principal separate works are: "American Ornithology, or the Natural History of Birds inhabiting the United States, not given by Wilson" (4 vols. 4to, illustrated, Philadelphia, 1825-'33, with descriptions of over 100 new species of birds discovered by him); *Specchio comparativo delle ornithologie di Roma e di Filadelfia* (Pisa, 1827, establishing a comparison between European and American birds); and *Iconografia della fauna Italica* (3 vols., royal 4to, richly illustrated, Rome, 1833-'41). His latest and partly posthumous productions comprise *Catalogue des oiseaux d'Europe* (1 vol. 4to, Paris, 1856); *Iconographie des pigeons*, and in conjunction with M. de Pouancé *Iconographie des perroquets* (Paris, 1857-'9). A volume of "Memoirs of Himself" was published in New York in 1836.—His wife, an accomplished woman, who translated Schiller's

dramas and assisted her husband in his scientific labors, died in Italy, Aug. 8, 1854. She bore him twelve children, four of whom died young. The surviving five daughters became respectively the wives of Marquis Roccagiovine, Count Primoli, Count Campello, and Prince Placido Gabrielli. The eldest son, JOSEPH LUCIEN CHARLES NAPOLÉON, born in Philadelphia, Feb. 13, 1824, barely escaped assassination in Rome, Feb. 10, 1850, though he was not connected with politics, and died in that city, Sept. 2, 1865. He was succeeded as head of the family by his brother, LUCIEN LOUIS JOSEPH NAPOLÉON, born in Rome, Nov. 15, 1828. He was ordained as a priest in 1853, and is a great favorite of Pius IX., whose privy chamberlain he was till 1868, when he was made cardinal. Napoleon III. conferred upon him in 1865 the title of French prince and of highness, and during the existence of the second empire he was generally regarded as a Bonapartist candidate for the papacy. His only surviving brother is NAPOLÉON GRÉGOIRE JACQUES PHILIPPE, born in Rome, Feb. 5, 1839. He married in 1859 the Italian princess Ruspoli, and the title of highness was conferred upon him in 1861. He became captain in the Algerian rifle corps, and joined the Mexican expedition. III. Louis Lucien, a philologist and chemist, second son of Lucien, born at Thorngrove, Worcestershire, England, Jan. 4, 1813. In his early life he resided in the United States and in Italy, mainly devoting himself to philological and other scientific studies. After the revolution of February, 1848, he was chosen member for Corsica to the constituent assembly, but his election was annulled. In 1849, however, he was chosen by the department of the Seine to the legislative assembly; and in 1862 he was made senator, with the title of French prince and highness. His works on chemistry, and especially on philology, won for him a doctor's diploma from the university of Oxford, the membership of the academy of sciences of St. Petersburg, and other marks of distinction. He has published translations of St. Matthew's parable of the sower into 72 European dialects; *La langue basque et les langues finnoises* (London, 1862); a Basque version of Solomon's Song (1868); and numerous other writings relating to Basque, Celtic, and other branches of philology, besides several works in French and in Italian on chemistry. IV. Pierre Napoléon, third son of Lucien, popularly known as Prince Pierre, born in Rome, Sept. 12, 1815. He went in 1832 to the United States, served with Santander in South America, and was involved in quarrels owing to his violent temper. He then returned to Italy, where he soon made himself obnoxious, and in 1836 the papal authorities ordered him to depart. Of the policemen who came to escort him to the frontier he killed the chief and wounded two of the subordinates; but being himself wounded in the fray, he was obliged to surrender, and for a considerable

time was imprisoned in the castle of Sant' Angelo. On his release he returned to the United States, where he was soon again involved in troubles. He next went to England, and afterward to Corfu. After having in vain offered his military services to France and Egypt, he at length obtained in 1848 employment in the foreign legion of the French army. He was elected to the constituent and legislative assemblies, where he acted with the extreme left, vehemently opposing all reactionary measures. In 1849 he joined the army in Algeria, but returned to France without permission at the most critical moment of a siege. For this he was cashiered with the express approval of the assembly; and he fought a duel with a journalist who had commended his dismissal. After the *coup d'état* of Dec. 2, 1851, he kept aloof from politics, though invested with princely dignities and endowments, and lived at Auteuil, near Paris, with his mistress, the daughter of a washerwoman of the faubourg St. Antoine, whom he married in 1869. In 1870 he acquired great notoriety by his assassination, on Jan. 10, of one of Rochefort's collaborators, the journalist Victor Noir, who with his colleague Ulrich de Fonvielle called at his country residence to demand satisfaction from him in behalf of their friend Paschal Grousset, who charged the prince with having disparaged him in a newspaper published in Corsica. The prince, after a brief altercation, shot Noir dead, and also aimed the revolver, which he had carried loaded in his pocket, at Fonvielle, who escaped unhurt. This event created a great sensation, and threw additional odium upon the imperial dynasty at a time when its fortunes had already begun to decline. Pierre was arrested, and to prevent disturbances in Paris, a high court, the members of which were carefully selected by the authorities, was convened at Tours, and the trial (March 20-27) resulted in his acquittal of the charge of murder, the prince pretending that he had acted in self-defence, having been slapped in the face by Noir. He was, however, condemned to pay an indemnity of 25,000 francs to the family of his victim, and to bear the costs of the trial. The emperor requested him to leave the French territory, and he has since resided in London, mainly supported by his wife, who opened a fashionable millinery establishment there under her princely title. She has borne him several children, who were legitimized after their marriage. V. *Antoine*, the fourth son of Lucien, born at Frascati, Oct. 31, 1816. He was educated in Italy, and went in 1832 to the United States in the hope of meeting his father, who however had already sailed for England. Afterward he resided with him in Italy, but became involved in trouble with the papal troops and had to leave Rome. He returned there after the revolution of 1848, but refrained from joining the ultra democrats. In 1849 he went to France, and was a conservative member of the legislative assembly till Dec. 2, 1851, when he retired from politics.

As he did not court his cousin the emperor, he was excluded from the endowments enjoyed by many of his relatives who pursued a more obsequious course.

BONAPARTE, Napoleon, emperor of France, born in Ajaccio, Corsica, Aug. 15, 1769, two months after the conquest of the island by the French, died at St. Helena, May 5, 1821. It is related that, his mother being taken in labor suddenly as she was returning from mass, he was born on a piece of old tapestry, on which were figured the events of the Iliad. As a boy he manifested a violent and passionate temper, and in the little disputes with his elder brother Joseph he always came off master. The traditions report also that he delighted in running after the soldiers, who taught him military manœuvres; that his favorite plaything was a small brass cannon; and that he regularly drilled the children of Ajaccio in battles with stones and wooden sabres. His first teacher was his mother, who exerted a powerful influence upon his mind. He was next admitted to the royal college of Ajaccio, and spent a short time with his father on the continent, and with his brother Joseph at the college of Autun. In his 10th year, April 23, 1779, he was sent to the military school at Brienne, where Pichegru was one of his instructors. His companions there regarded him as taciturn and morose; but as he was a Corsican, speaking very little French, and poor as well as proud, like those islanders generally, his conduct is doubtless to be ascribed as much to his circumstances as to his temperament. Toward those who showed him sympathy, like Bourrienne, he was susceptible of strong attachments. The annual report of the school for 1784 says of him: "Distinguished in mathematical studies, tolerably versed in history and geography, much behind in Latin and belles-lettres, and other accomplishments; of regular habits, studious, and well behaved, and enjoying excellent health." His favorite author was Plutarch. The stories of his assuming undue authority over his fellows are contradicted by Bourrienne in his *Mémoires*. In 1784 Napoleon repaired to the military school at Paris to complete his studies. He was shocked at the expensive style of living there, and wrote a letter against it to his late superior at Brienne, Père Berton. In September, 1785, he was commissioned a sub-lieutenant of artillery, and soon afterward was promoted to be first lieutenant of artillery in the regiment of Grenoble, stationed at Valence. There he wrote an essay for the prize offered by the Lyons academy, on the question, "What are the principles and the institutions necessary to make man happy?" and was successful. Talleyrand, having procured this essay, showed it to Napoleon when he was at the height of his power, and he cast it into the fire. With his friend De Manis he also made an excursion during that time to Mont Cenis, which he purposed to describe in the style of Sterne's "Sentimental Journey,"

then much in vogue; but he did not complete what he had designed. A pretty Mlle. Calombier of Valence, with whom he had stolen interviews and "ate innocent cherries," was supposed to have inspired the sentimental part of this literary plan. A more suitable undertaking was the project of a history of Corsica, which he began, and communicated to Paoli, then living in exile in London. The parts of it still preserved are full of warm patriotic expressions and vehement democratic thoughts. They were not phrases borrowed from the classic authors, but the spontaneous outbursts of a fresh young mind, stimulated by the spirit of his age, and not yet contaminated by the experiences of life, or fettered by its own schemes of aggrandizement. Napoleon visited Ajaccio every year, and interested himself in furthering the education as well as the fortunes of his brothers and sisters. Though not the oldest son, he was instinctively recognized as the true head of the family, his father having died in 1785. His allowance in those days, probably furnished by his uncle, was 1,200 francs. Nothing could have been more decided than his democratic tendencies at this period. The great revolution of France was already moving powerfully onward, and he, in common with the other officers of the regiment at Valence, watched its complicated movements with deepening anxiety. Many of those officers openly took part with the royalists, while others, and among them Napoleon, inclined as strongly to the revolutionary side. On Feb. 6, 1792, he became a captain of artillery by seniority, and in the same year, being at Paris, he witnessed the insurrections of June 20 and of Aug. 10. Bourrienne relates that on the former of these occasions, when he saw the mob break into the palace, and force the king to appear at the window, with the *bonnet rouge* on his head, Bonaparte exclaimed: "It is all over with that poor man! A few discharges of grape would have sent those despicable wretches flying." Paoli, having emerged from his retirement, had been enthusiastically received at Paris, and invested with the presidency and military command of his native island, where the ferment of revolution was also at its height. Ajaccio appears to have been for a while the headquarters of the patriots, the Bonaparte house their place of meeting, and Joseph and Napoleon (who had returned hither) the acknowledged leaders. But Paoli's views of liberty were far more moderate than those of the national legislature, and in a little while he found himself in direct opposition to the government. The Bonapartes, strongly attached to him personally, did not follow him in this movement, as the inhabitants of Ajaccio did generally, but adhered to the cause of the convention. A civil war was the consequence of Paoli's defection; and in the course of it Napoleon, who acted provisionally as the commander of a battalion of the national guard, had the unpleasant duty laid upon him of assaulting his native place.

He succeeded against it at the outset; but the besieged party rallying, and his communication with the frigate which had set him ashore having been cut off, he was deprived of his temporary success, and in turn besieged in the tower of Capitello. During this time he and his 50 men were reduced to the extremity of living for three days upon horse flesh, when some shepherds from the mountains released them from their situation. The exasperation of the adverse faction now drove the Bonapartes out of Ajaccio. Madame Lætitia, frightened by the signs of imminent danger, fled with her children to Milelli, and thence across the rugged mountain roads to the seashore, where they concealed themselves in the thickets until Napoleon succeeded in conveying them to Nice, whence they removed to Marseilles (1793). During their residence at Marseilles Napoleon was employed by the general commanding the artillery of "the army of Italy" to negotiate with the insurgents of Marseilles and Avignon. In the latter place he published in the same year a little pamphlet called *Le souper de Beaucaire*, in which he endeavored to persuade the excited people of those parts not to provoke the vengeance of the revolutionists, who were then the ruling power, and who were dealing a fearful retribution upon all whom they suspected to be the enemies of the country. Its sentiments were generally republican, and in favor of the Montagne, as against the Girondists, but not at all Jacobinical, as has been alleged. The pamphlet is given in Bourrienne, and translated in the appendix to Sir Walter Scott's "Bonaparte." But the provinces were not the sphere for Napoleon, and he repaired to Paris, where he spent a part of the summer of 1793. In September he was ordered on service at the siege of Toulon, then possessed by the Spanish and English, where he displayed such extraordinary military intelligence and activity as to lay the foundation of his whole subsequent military career. After reconnoitring Toulon for a month, he communicated to the council of war a plan of attack, which was adopted, and which he himself executed with brilliant success. The place was so important that the capture of it diffused a general joy over France, and gave to the young colonel of artillery, by whom the reduction had been chiefly accomplished, a distinguished name. In consequence of his services, he was recommended by Gen. Dugommier for promotion, and on Feb. 6, 1794, was made a brigadier general of artillery. He was then in his 25th year. Dugommier's letter to the committee of public safety in regard to him said sagaciously enough: "Reward this young man and promote him; for, should he be ungratefully treated, he will promote himself." Joining the army under Gen. Dumerbion, stationed at the foot of the Maritime Alps, he made the campaign of 1794 against the Piedmontese troops. On the downfall of Robespierre, on the 9th Thermidor, 1794, he was sus-

pected by the moderate party of too strong a sympathy with that leader, and, in spite of his disclaimers, was temporarily put under arrest. He wrote a sharp remonstrance against this proceeding, and was released by the committee of public safety, after a detention of about a fortnight. At the close of the campaign of that year he went to Paris again to solicit some new employment, but, in spite of his abilities, he did not procure it instantly. His letters to his brother Joseph, written during this time, have the tone and manner of those of a mere adventurer, somewhat depressed by ennui, and waiting impatiently upon fortune, though ready for any good luck that may turn up. "Life," he remarks, "is a flimsy dream, soon to be over," as if he was yet unsuspicious of what a disturbed and restless dream his was destined to be. He lodged in the rue du Mail, near the place de la Victoire, often complained of his poverty and suggested schemes for raising money, and at one time thought of offering his services to the sultan of Turkey. But the constitution of the year III. organizing the directorial government having in the mean time been adopted (1795), and the Thermidoreans of the convention which adopted it having passed two decrees declaring that the two new councils created by the constitution should in the first instance be constituted of two thirds of the present and one third of new members, and ordering the electoral bodies to nominate the third that were to be returned, a new germ of civil war was planted. The sections or primary assemblies of Paris resisted this dictatorial attempt of the convention to perpetuate its own power, and the convention prepared to put down the sections. The convention held at its disposal some 5,000 regular troops, besides a large number of cannon, under the general control of Barras, one of its members. Menou was at first chosen to lead these troops against the people, but, through indecision or want of energy, failed in his movements. Barras, who had known Napoleon at Toulon, then said to the committee of the convention that the young Corsican, who was already employed by them in some slight military occupation, was the very person to take command. They accordingly gave it to him, and he, willing to fight for the people or against them, as best served his own designs or necessities, made his arrangements for the dispersion of the populace. On the morning of the 13th Vendémiaire (Oct. 5, 1795), the national guards, as the defenders of the sections were called, advanced, to the number of 30,000 men, along the quays of the Seine, the rue St. Honoré, and other approaches to the Tuilleries. Everywhere as they advanced, however, they encountered a most formidable resistance. Napoleon, though he had but one night to make his arrangements, left no point undefended, while he established bodies of troops in the best positions, and to a fire of musketry returned a murderous discharge of cannon.

In less than an hour of actual fighting he secured the victory to the convention, and, Barras resigning, he became the commander-in-chief of the army of the interior. One of the letters addressed to Joseph by Napoleon during intervals of his idleness said, jokingly, "If I stay here it is possible I may be fool enough to marry," and fortune had already prepared his bride for him. Moving in the society of Barras, Tallien, Carnot, and their families, was a young widow named Josephine Beauharnais, a native of Martinique, and possessed of rare beauty and accomplishments. Bonaparte paid his addresses to her, and was soon an accepted lover. On Feb. 28, 1796, he was appointed, at the instance of Carnot, to the command of the army of Italy, which for three or four years had been carrying on an indecisive war against the Sardinians and Austrians, amid the defiles of the Alps and the Ligurian Apennines. His marriage took place the next month, March 9, and in less than a week afterward he departed to assume command. His army consisted of about 35,000 men, and was in a miserable state of destitution as to clothing and provisions, and considerably relaxed in discipline. The allied army opposed to him contained some 60,000 men, conducted by Beaulieu, an experienced and courageous general, and manœuvred according to the most skilful strategies of the time. But, in spite of the superiority of numbers and experience, Napoleon brought to the campaign several incontestable advantages: 1, the enthusiasm and alacrity of a young mind given for the first time a separate and independent field of glory, and determined on conquest or ruin; 2, an unrivalled power of combination, joined to a celerity of movement that seemed almost miraculous; and lastly, the free use of such a stimulant to the hopes of impatient and desperate troops, half famished amid the barren Alpine rocks, as the promise of an unrestrained enjoyment of "the rich provinces and opulent towns" of Italy. Against France, at that time, a formidable coalition, consisting of England, Austria, Bavaria, Piedmont, Naples, and several minor states both of Germany and Italy, was arrayed; but Austria was the principal of the league, and the possession of Italy the key to the situation. Napoleon perceived this, and at once proceeded to make himself master of Italy. On April 12 he gained a victory at Monte Notte; on the 14th, that of Milleseimo; on the 15th, that of Dego; on the 21st, that of Mondovi; by which series of successes the king of Sardinia was compelled to sue for peace. Turning his attention next to upper Italy, he advanced upon Lodi, where he forced the passage of the Adda, May 10, in a brilliant battle which put Lombardy in his power. On May 15 he entered Milan, where heavy contributions were levied upon the state, and the principal works of art seized and sent to Paris. Naples, Modena, and Parma hastened to conclude a peace, and the pope was forced to sign an

armistice. Mantua was the next object of attack. Wurmser, at the head of large Austrian reinforcements, came through Tyrol to the defence; the two main divisions of his army were defeated at Lonato, Aug. 3, and at Castiglione delle Stiviere, Aug. 5, and driven back. On Sept. 4 another division of the Austrians was repulsed at Roveredo. Wurmser, having rallied his scattered troops in the mean time, was again attacked and routed at Bassano, Sept. 8. A third Austrian army, under Marshal Alvinczy, now entered Italy, and for a part of the autumn held the French in check; but on Nov. 15 a battle was joined at Arcole, which, after three days (15th-17th) of the hardest fighting that had yet occurred in the Italian campaign, gave the victory again to the French. Bonaparte then turned his attention to the settlement of the internal affairs of Italy, which was everywhere disturbed, and in many places in insurrection. A letter written to the directory, Dec. 28, 1796, reveals the principles upon which he acted in his various arrangements: "There are in Lombardy three parties: 1, that which is subservient to France and follows our directions; 2, that which aims at liberty and national government, and with some degree of impatience; and 3, that which is friendly to Austria and hostile to us. I support the first, restrain the second, and put down the third. As for the states south of the Po, there are also three parties: 1, the friends of the old government; 2, the partisans of a free aristocratical constitution; and 3, the partisans of pure democracy. I put down the first; I support the second, because it is the party of the great proprietors, and of the clergy, who exercise the greatest influence over the masses of the people, whom it is our interest to win over to us; and I restrain the third, which is composed chiefly of young men, of writers, and of people who, as in France and everywhere else, love liberty merely for the sake of revolution." In the beginning of the year 1797 Austria again took the field with a formidable army, which Napoleon encountered, Jan. 14, at Rivoli, and defeated. Immediately afterward Wurmser, who had stood an obstinate siege in Mantua, was compelled to surrender. On the same day, proclaiming that the truce with the pope was at an end, Napoleon entered the papal territories, and repulsed the papal troops on the Senio; took Faenza, and in quick succession Ancona, Loreto, and Tolentino; and on Feb. 19 forced the pope to conclude a peace. By this he was enabled to wage war upon Austria on her own soil. He crossed the Piave, and on March 16 forced the passage of the Tagliamento and the Isonzo; on the 19th he seized Gradisca, on the 20th Görz, and on the 23d Trieste. Before April 1 the greater part of Carinthia, Carniola, and Tyrol was reduced to subjection. On April 7 he granted the deputies of the archduke Charles an armistice of five days, and on the 18th of the same month concluded preliminaries of peace at Leoben,

which laid the Austrians under pretty severe conditions, and assured the French possession of Trieste, whence they proceeded to assail Venice. On May 8 a declaration of war against that republic was published, on the pretended ground of its having violated neutrality; and on May 12 the city was occupied, and a new constitution, somewhat less aristocratic than the old, was improvised. During the same month Genoa was revolutionized, and early in June received a new French constitution as the "Ligurian republic." On June 29, at Milan, the new Cisalpine republic was proclaimed, and speedily organized; and on July 14 the French army, retiring from the territories of the new republic, took up cantonments in the Venetian states. During the remainder of the summer and the autumn Napoleon was engaged in conferences and negotiations for a definitive treaty of peace with Austria, which was signed at Campo Formio, Oct. 17. By that celebrated arrangement Austria ceded her Lombard territories to the Cisalpine republic, and her former possessions in the Low Countries to France, guaranteeing the extension of its boundary to the left bank of the Rhine, while she received the Venetian provinces of Istria and Dalmatia, and the mainland of the republic as far as the Adige. Of the violence, the pillage, and the despotism which marked these Italian campaigns, it is for history to speak; but they did not prevent the popular French sentiment of the time from hailing Napoleon when he returned to Paris, Dec. 5, 1797, not merely as the conqueror, but as the liberator of Italy. In the short space of two years he had won a series of the most splendid victories on record, dictated forms of government to nearly the whole of Italy, humbled Austria, acquired large accessions of wealth and territory for France, and rendered the French arms formidable to the world. Under these circumstances, his journey from Italy to Paris was, of course, a triumphal procession; the enthusiasm of the Parisians was immense, and the festivals in his honor were endless; but Napoleon received his honors with becoming moderation, and was in fact sombre and thoughtful. Being a member of the institute, he assumed its dress, associated principally with men of science, and in all the congratulatory addresses of the period was extolled for his simplicity, his modesty, and his complete want of ambition.—The directory, then in power, had created an "army of England," with a view to hostilities against that country, and conferred the command of it on Bonaparte. He appeared to favor the movement, but at heart he disliked it, knowing how impracticable an attempt to conquer the island would prove; and he sought to substitute for it a magnificent dream of his own, the conquest of Egypt and the East. At last the directory consented to this, and Napoleon made his preparations to embark at Toulon. By May 9, 1798, a great army had been collected, and the expedition

set sail on the 19th. On June 10 it landed at Malta, and on the 12th took possession of the island, which was garrisoned by the French. A week later the fleet renewed its course, reaching Alexandria July 1. On the following day the French took the city, and having secured it advanced toward the Nile. They crossed the desert, and reached the river July 10. A flotilla ascended the stream, while the army marched along the shore. Arriving before Cairo July 21, they encountered a large body of Mamelukes under Murad Bey, which, after a most determined struggle, was repulsed. The battle was called the battle of the Pyramids, and the success of the French struck terror far into Africa and Asia. Many of the surrounding tribes submitted to the conqueror. But fortune was preparing for him a terrible reverse. His fleet, consisting of 13 ships of the line, besides frigates, was found in Aboukir bay by Nelson, the English admiral, who had long been in pursuit of it, and was attacked on the evening of Aug. 1, with a degree of vigor and activity which was never surpassed in naval warfare. The whole squadron, with the exception of two ships of the line and two frigates, was destroyed or captured. Bonaparte being cut off from the means of return, the sultan issued a declaration of war against him, Sept. 10, for invading one of his provinces, incited an insurrection in Cairo, and prepared to send an army into Egypt. In February, 1799, Bonaparte crossed the desert with about 13,000 men, took El-Arish and Gaza, stormed Jaffa, where 2,500 Turkish prisoners were deliberately massacred, and advanced into Syria. On March 17 the French army reached Acre, defended by a strong force of English, under Sir Sidney Smith, and two ships of the line. Repeated but ineffectual attempts to storm the place were made up to May 20, when Napoleon saw himself compelled to abandon the siege. The French army retreated to Cairo, which place they entered June 14. The Syrian campaign, which had lasted three months, cost the French 4,000 men, who were either killed or died of the plague. On July 25 they recovered the possession of Aboukir from the Turks, after which Napoleon, whom his brother Joseph had succeeded in informing of the distracted condition of France and the growing unpopularity of the directory, returned home privately with a few personal adherents. He endeavored to conceal the failure of his expedition under the glory of its immense scientific results, but he could not disguise from himself that his plan to molest the English supremacy in India, to colonize Egypt, to give France the command of the Mediterranean, and to build up for himself, perhaps, a vast oriental empire, had miscarried. He returned in time to take advantage of the political intrigues then rife, and, by the *coup d'état* of the 18th Brumaire (see BRUMAIRE), to attain supreme power as first consul of the republic (December, 1799). From this time his line of policy unfolded itself

more distinctly; to establish order at home, and to humiliate the enemies of the nation, were the honorable objects of it; but the extension of his own power was unfortunately an end scarcely less conspicuous. Nothing could have been more needed than a reformation of the administrative departments; the finances were deranged, the treasury empty, the taxes increasing, and trade at a standstill. In the same summary manner in which he ordered his troops, but with remarkable sagacity, and still more remarkable courage and activity, Bonaparte undertook to reform civil affairs. At the same time, Austria, England, and the Porte, if not carrying on active hostilities against France, refused all terms of peace, and a civil war was raging in La Vendée. Suppressing the latter by a series of decided but conciliatory measures, he turned his whole attention to the continental war. An army was secretly concentrated near the lake of Geneva, with which he passed the Great St. Bernard May 14-20, 1800, and entered Milan June 2. On the 14th of the same month, after several unimportant skirmishes, he met the Austrians under Gen. Melas at the village of Marengo, where he achieved another brilliant victory, and by this unexpected blow at once recovered the supremacy of France in Italy, which had been lost in his absence. Having established provisional governments at Milan, Turin, and Genoa, he returned to Paris, where he was received, July 3, with immense enthusiasm, but in December barely escaped assassination by an infernal machine. As his general, Moreau, had also defeated the archduke John in the great battle of Hohenlinden, Dec. 3, 1800, Austria was obliged to make a separate peace. The preliminary treaty of Lunéville, dated Feb. 9, 1801, made a new arrangement of the states of the continent; and although it was essentially the same as that of the treaty of Campo Formio, it contained provisions which laid the foundation of much subsequent trouble. Pursuant to the same objects, treaties were concluded with Spain, March 21, 1801; with Naples, March 18; with the pope, July 15; with Bavaria, Aug. 24; with Portugal, Sept. 29; with Russia, Oct. 8; with Turkey, the 9th; with Algiers, Dec. 27; and the treaty of Amiens with England, March 27, 1802. Thus it seemed as if a universal cessation of hostilities was about to mark the history of Europe. To the title of conqueror the first consul now added that of pacificator. But his attempt to crush an insurrection of the blacks in Santo Domingo, for which an expedition had been sent out toward the close of 1801, under his brother-in-law Gen. Leclerc, is not to be regarded as one of the grounds of this latter title. The greater part of the army, some 20,000 in number, was swept away by fever and the sword; the blacks were instigated by brutal cruelties to still more brutal massacres; and the island was desolated by the fiercest exhibitions of alternate terror and revenge. It was by the direct act of Napoleon

that slavery was reestablished in Guadeloupe, and the slave trade reopened. Toussaint Louverture, an able and courageous Haytian negro, who had made himself the leader of his struggling countrymen, was seized during a truce, and carried to France, where he died in prison. Napoleon availed himself of this interval to perfect the administration of the interior affairs of his country. A general amnesty allowed all the French emigrants to return home; a new order of knighthood known as the legion of honor was established, and the constitution of the Cisalpine republic was perfected. On Aug. 2, 1802, Bonaparte was proclaimed consul for life by a decree of the senate, which was confirmed by a popular sanction of some 3,000,000 votes. A *senatus consultum*, issued a few days after, reconstructing the electoral bodies and reducing the tribunate to 50 members, indicated, however, that he was not yet satisfied with the dignity to which he had been raised. Many persons saw in the movement a cautious step toward a still more absolute power.—It is to this period that the greatest of Napoleon's services to France belongs. The civil code, which has ever since been the law of the nation, was then digested and arranged by a commission of eminent lawyers and civilians, under the presidency of Cambacérès. The various branches of public instruction also attracted his attention; and the lyceum, the college of France, the polytechnic and other military schools, were organized on the most liberal scale. But the perfection of the centralization begun by the revolutionary assemblies, which reduced the provincial administration of France to one uniform plan, having its head at Paris, and completely abrogating the old communal liberty and independence, was a more questionable reform. Nor were his efforts to restore the religious harmony of France, by renewing the ancient privileges of the Catholic priests, as happily conceived as many of his political improvements. In fact, like nearly all organizers and reformers, Napoleon undertook too much, and in the exaggeration of his own powers fell into many mistakes. Yet, in considering the epoch of the consulate, it is impossible not to derive from it a high admiration of the scope and versatility of Napoleon's genius, and a general sympathy with his public aims. But already his head was giddy with success, and in the midst of the great labors of 1802 he coveted the imperial diadem. Disturbances in Switzerland in the beginning of 1802 caused Napoleon to resort to an armed mediation in its affairs; in August of the same year the island of Elba was united to France; on Sept. 11 the incorporation of Piedmont took place, and in October that of the duchy of Parma. England professed to see in these events an infringement of the treaty of Amiens, and in a short time there was an open resumption of hostilities. On March 21, 1803, a *senatus consultum* placed 120,000 conscripts at Napoleon's com-

mand, while England made no less active preparations. On May 18 England declared war against France, and laid an embargo upon all French vessels in her ports. France retaliated by a decree that all Englishmen, of whatever condition, found on her territory, should be detained as prisoners of war; and Gen. Mortier was sent to occupy the electorate of Hanover, as belonging to Great Britain. In the mean time, the police of Paris professed to have discovered a conspiracy against the life of the first consul, in which Pichegru, returned from exile in Guiana, Georges Cadoudal, a Chouan chief, and Gen. Moreau were said to be concerned. These were arrested, and suspicions of complicity attaching to the duke d'Enghien, son of the duke de Bourbon and grandson of the prince de Condé, the neutral territory of the grand duchy of Baden was invaded in order to effect his seizure. He was taken during the night of March 15, 1804, conveyed to the citadel of Strasburg, and thence, under escort, to the castle of Vincennes. A military court, consisting of seven, was hastily summoned there by the first consul, by which the duke was tried and found guilty of the charges of bearing arms against France, of offering his services to England, of conspiring with emigrants on the frontiers, and being an accomplice of the Paris conspirators. He was sentenced to death, and executed the next morning, March 21, between 4 and 5 o'clock. On April 6 Pichegru was found dead in his prison. At a later period Georges Cadoudal and others were executed, while some of their confederates were reprieved, and Moreau was banished.—It was in the midst of these sinister events that a motion was made in the tribunate by one Curée that Napoleon be made emperor of the French, with the right of succession to his family. Carnot spoke against the motion with much patriotic fervor, but it was carried by a large majority. On submission of the question to the votes of the people, an apparent popular sanction was given to the deed, and on May 18 Napoleon assumed the imperial title. He requested the pope to perform the ceremony of his coronation. Pius VII., after consulting with his cardinals, came to Paris for that purpose in November. On Dec. 2 the "soldier of fortune," as he had been sometimes called, was consecrated at the altar of Notre Dame, "the high and mighty Napoleon I., emperor of the French." Being emperor, he proceeded to surround himself with all the splendors and gauds supposed to be essential to the dignity. He created a new nobility with sounding titles; he opened a brilliant court; he restored the etiquette of royalty, and in a thousand other ways sought to dazzle weak minds by ostentation and parade. The changes which had taken place in France rendered changes in the Italian governments necessary, and from republics they were transformed into a kingdom. Napoleon went to Milan, where on May 26, 1805, he was anointed

king of Italy, in the midst of imposing ceremonies and theatrical pomp. The same summer the northern powers listened to the solicitations of England, and united in a coalition against the new emperor. Russia, Austria, and Sweden joined in the charges of territorial usurpation which were levelled at Napoleon; but Prussia, already bribed by him with the promise of Hanover, could not be seduced into becoming a party. By September the French forces in eight divisions, and numbering 180,000 men, were upon the Rhine, ready to act against Austria. That country, governed by decrepit bureaucrats, sent forward its troops under an incompetent general, Mack, without waiting for the Russian allies. On Oct. 17, being completely surrounded by Napoleon at Ulm, he conditionally capitulated, and on the 20th he surrendered his whole army of 28,000 men. The next day, however, the great victory of Nelson at Trafalgar, over the combined fleets of France and Spain, compensated the allies for this reverse. Nothing daunted by the naval disaster, Napoleon advanced to Vienna, which city he entered Nov. 18, where he made his preparations to meet the combined armies of Russia and Austria, then concentrating on the plains of Olmütz. On Dec. 2, 1805, the grand encounter came on at Austerlitz, and after a struggle of unexampled energy—in which three of the greatest armies of Europe, each commanded by an emperor, with the mastery of the continent for the prize, met in desperate strife—Napoleon won the victory, the most glorious perhaps of his career. The allies were thoroughly routed; the emperor of Austria made instant peace, while the emperor of Russia withdrew into his own territories. The king of Prussia was rewarded for his neutrality by the possession of Hanover, and England alone remained to stem the tide of success which was bearing forward the victorious Corsican. As the king of Naples, instigated by his wife, an Austrian princess, had received the troops of Russia and England into his dominions during the recent war, Napoleon construed the act into one of predetermined hostility, and in February, 1806, sent an army under his brother Joseph to occupy the country. The king fled to Sicily, when Napoleon declared the crown vacant, and conferred the title of king of Naples and Sicily upon Joseph, March 30. Following this by another decree, he transformed the Batavian republic into a kingdom, dependent upon France, and gave the crown to his brother Louis, June 5. About the same time he erected various districts in Germany and Italy into dukedoms, which he bestowed upon his principal marshals. But a more important act was that of July 12, which created the confederation of the Rhine, and which some 14 princes of Germany were induced to join, thereby placing themselves under the supremacy of France, and detaching some 16,000,000 people from the tottering German empire. The policy which Napoleon had pur-

sued in making two of his brothers kings, he now extended to his sisters and brothers-in-law, who were distributed as rulers over various countries of the continent. William Pitt, the minister of Great Britain, having died Jan. 23, 1806, and Charles Fox succeeding to his place, negotiations were opened between France and England in regard to the termination of hostilities. In the course of these, propositions were entertained looking toward a restoration of Hanover to the latter power, which at once opened the eyes and aroused the jealousies of Prussia. It was not long before the Prussian monarch acceded to the coalition against Napoleon, and entered into active preparations for war. The emperor, whose celerity of action was prodigious, instantaneously moved toward Prussia with a powerful force, and by Oct. 8, 1806, had reached the Prussian outposts. On the 14th he routed the enemy with fearful slaughter at Jena, and the same day Marshal Davoust achieved most important successes at Auerstädt, the duke of Brunswick being among the killed. By this double encounter, in which more than 20,000 Prussians were killed, the strength of the kingdom was fatally broken, and Napoleon followed up his victories with such signal energy that, in two weeks from the commencement of hostilities, Oct. 27, he entered the Prussian capital in triumph. After occupying almost all the fortresses, and reducing such towns as still maintained a show of resistance, he issued from Berlin, Nov. 21, the famous decree, declaring the British islands in a state of blockade, forbidding all correspondence or trade with England, defining all articles of British manufacture or produce as contraband, and the property of all British subjects as lawful prize of war. Meanwhile the Russian allies, who had advanced as far as the Vistula, were driven back through Poland, and the French entered Warsaw. A winter campaign was then begun against the Russians; but after the indecisive battle at Pultusk, Dec. 26, the Russians retreated to Ostrolenka, and the French behind the Vistula, toward the north. The month of January, 1807, was spent in repose and preparation by both sides, and on Feb. 7 and 8 a desperate engagement took place at Eylau, in which a loss of 50,000 men was divided between them, and both claimed the victory. The following May Napoleon attacked and conquered the important fortress of Dantzic, and having reinforced his army with 200,000 men, he once more advanced against the Russians. On June 14 the battle of Friedland was fought, and the Russians were so worsted that Alexander asked for an armistice. The two emperors met for the first time, June 25, on a raft in the middle of the Niemen, and on July 7 a treaty of peace was concluded at Tilsit. The Prussian monarch received back about half his dominions; the duchy of Warsaw was created and given to the elector of Saxony, an ally of the

French, who was made a king; while the principal Prussian fortresses and seaport towns remained in the possession of the French till a more general peace should be concluded. Russia obtained a part of Prussian Poland, and by secret articles was allowed to take Finland from Sweden. Out of the Prussian territory on the left bank of the Elbe, Hesse-Cassel, Hanover, and Brunswick, the new kingdom of Westphalia was formed, and bestowed upon Jerome. Soon after the treaty of Tilsit, England, conceiving that Napoleon, with the connivance of Russia, was about to make arrangements with Denmark and Portugal for the conversion of their fleets to his purposes, which would expose her to the assaults of the combined navies of Europe, sent a powerful squadron to bombard Copenhagen. Denmark, upon the surrender of that place, threw herself openly into the hands of France. As to Portugal, however, which had refused to enforce the Berlin decrees against England, and despatched her fleet to Brazil, at the instigation of England, to avoid lending aid to France, Napoleon declared that the house of Braganza had ceased to reign, and sent Junot to occupy Lisbon. On Nov. 27, 1807, the prince regent, the queen, and the court of Portugal embarked for a foreign port, and on the 30th the French entered their capital. In December of the same year Napoleon became involved in a serious controversy with the pope, which led to the annexation of the Adriatic provinces to his kingdom of Italy, and to the military occupation of Rome. At the same time Napoleon found a pretence for interfering in the affairs of Spain. A series of corrupt intrigues, in which the king, Charles IV., his queen, the favorite Godoy, and the pretender to the throne, Ferdinand, son of Charles, were engaged, had involved the internal administration of Spain in inextricable confusion. Napoleon cut the Gordian knot with his sword. Madrid was occupied by Murat, March 23, 1808; Charles and Ferdinand were both induced by Napoleon to abdicate at Bayonne, and he made Joseph king of Spain, transferring the kingdom of Naples to Murat. Many of the Spanish nobility acquiesced, but the great body of the people rose in arms against the French. Ferdinand, although a prisoner in France, was declared by them the legitimate monarch, while England sent immense supplies to sustain the insurrection, and Napoleon prepared to enforce his policy. A war which lasted nearly six years was thus begun in the peninsula. At the outset the Spaniards were successful. On June 14 a French squadron was captured by the English fleet in the bay of Cadiz; on the 28th Marshal Moncey was repulsed in an attack upon Valencia; for two months Palafox made a heroic defence of Saragossa; on July 20 the new king made his triumphal entry into Madrid; on the 23d Gen. Dupont, with 18,000 men, surrendered to the Spaniards at Baylen; and a week

later Joseph, with all his remaining forces, commenced a retreat beyond the Ebro. On Aug. 21 Marshal Junot was defeated at Vimeira by Sir Arthur Wellesley, and this battle led to the convention of Cintra, under which Portugal was evacuated by the French forces. Napoleon therefore deemed it necessary to take the field in person, and in the early part of November appeared in the north of Spain with 180,000 men. The Spaniards were rapidly defeated at Reynosa, Burgos, and Tudela, and on Dec. 4 he entered Madrid. The British troops, hastening to the assistance of the Spaniards, were pursued to and ineffectually attacked at Corunna, but their leader, the gallant Sir John Moore, was fatally wounded. The presence of Napoleon seemed to have redeemed nearly every reverse. But in January, 1809, he was compelled to return to Paris to counteract the movements of Austria, which, taking advantage of the peninsular war, had sent forward large bodies of troops into Tyrol and Italy. On April 17 he assumed the command of his army, and before the close of the 22d he had completely routed the Austrian forces. On that day, at Eckmühl, he defeated the archduke Charles; on May 18 he again entered Vienna; on the 21st and 22d he was worsted at Aspern and Essling, but on July 6 he more than recovered all his losses, gaining a stupendous victory at Wagram, which enabled him to dictate once more his own terms of peace. During these troubles the Tyrolese seized the opportunity to raise the standard of insurrection; the British made a descent upon the coast of Holland; Sir Arthur Wellesley was carrying on a most effective war in Spain, and the difficulties with the pope were renewed; yet Napoleon contrived to make face against all these assaults. By a decree of May 17 the Papal States were annexed to the French empire, which was followed by a bull of excommunication against Napoleon, when the pope himself was arrested and conveyed to Paris, where he remained a virtual prisoner till 1814. In the midst of his triumphs an attempt upon Napoleon's life was made, Oct. 13, by a young German named Staps, from which he had a narrow escape. To crown the events of the year, it was announced in December that Napoleon was about to repudiate his wife Josephine, by whom he had no issue, in order to contract an alliance with some of the dynastic families, and thus procure to himself a successor of royal blood. On the 16th of that month an act formally divorcing him was passed by the obedient commissioners of the senate; and on April 2, 1810, he was married to the archduchess Maria Louisa, a daughter of the emperor of Austria. Josephine retired with a broken heart to Malmaison, and the new empress took the place of the affectionate and devoted companion of his early years. From this union there was born a son on March 20, 1811, who was proclaimed in his cradle king of Rome. The French empire had now reached

its greatest extent and its highest glory. In addition to the original 86 departments of France (including Corsica), it embraced three departments along the Alps, 15 W. of the Rhine, 15 beyond the Alps in upper and central Italy, and 7 Illyrian provinces, besides exercising control in Holland, in Spain, in the Italian kingdoms, in Switzerland, and in the confederation of the Rhine. The French code and French ideas were predominant at Warsaw, at Milan, at Naples, in Holland, Westphalia, and Bavaria. To Sweden a king was given in the person of Bernadotte. Holland, after having had his brother Louis as king, was annexed to France by decree of the senate, July 9, 1810. But in the Spanish peninsula the progress of the French was slow. Sir Arthur Wellesley, who had recently been made Viscount Wellington, exhibited a degree of military skill and activity which easily held the marshals of Napoleon in check, and called for the presence of the grand master of war himself. On July 10, 1810, the fortress of Ciudad Rodrigo capitulated to Ney, but on Sept. 27 Masséna was defeated by Wellington at the heights of Busaco, and on Nov. 14 driven from before the fortified lines of Torres Vedras. Early in 1811 Soult besieged Badajoz, and captured it on March 11, but on May 16 he was routed at Albuera. Thus a series of alternate successes and reverses marked the campaign throughout the year. The surrender of Valencia to Suchet, Jan. 9, 1812, was, however, the last of the French triumphs. Ten days afterward Wellington recaptured Ciudad Rodrigo; April 6, he recaptured Badajoz; July 22, he worsted Marmont at Salamanca; and 20 days later the capital of Spain was in the possession of the victorious English captain. But not until the battle of Vitoria, June 21, 1813, were the French driven entirely beyond the Pyrenees. Napoleon was personally occupied at the time with a greater enterprise than that of the reduction of Spain. His good understanding with Alexander of Russia had come to an end. The czar complained of his encroachments upon the interests of Russia, especially upon her commerce in the northern seas, and the commencement of the year 1812 saw both emperors engaged in formidable preparations for war. The scheme of a universal monarchy, which dazzled the ambition of Napoleon, seems to have blinded him to the consequences of his acts, or to have allured him to conquest with utter indifference to other results. A "grand army" of more than 500,000 men was gathered on the frontiers of Poland to enter upon the Russian campaign—one of the most stupendous as it was one of the most disastrous events in the records of history. Three hundred thousand Russians assembled on the banks of the Niemen to oppose the mighty force of the French. On June 24, 1812, Napoleon crossed the river, and the Russians retired step by step before the invaders. Tempests, rains, and famine

scoured the camps of the French, and yet they pushed forward. Under the walls of Smolensk, on the evening of Aug. 16, a division of the Russians ventured to make a stand against an advanced division of the French, and before the morning of the 18th the entire city was a heap of smoking ruins. Both the main armies drove rapidly on toward the city of Moscow. On Sept. 6, at the small village of Borodino, they halted, and came face to face with each other, resolved to risk a trial of strength. As the morning of the 7th dawned, a solitary gun announced the beginning of the fight; immediately 1,000 cannon belched forth their fire of death; more than 250,000 men were enveloped in the dense smoke of the conflict; and when the night fell more than 80,000 killed and wounded heaped the field. On the following day the Russians retired into Moscow, only to prepare the inhabitants to withdraw in a body before the irresistible arms of France. On the 15th, when Napoleon rode into the ancient capital, it was as silent as the desert, and he took up his residence in the Kremlin. But suddenly, at midnight, the city burst into flames in every direction, and the baffled French, enveloped in fire, were compelled to seek refuge in the desolate surrounding country. Napoleon lingered over the splendid ruins till Oct. 19, when, all his proposals for a peaceful adjustment of difficulties being rejected, he was reluctantly compelled to order a retreat. At first the weather was fine, and only moderately cold; but soon the snow, the rain, fatigue, and swarms of harassing Cossacks threw the dispirited Frenchmen into disorder. Then commenced that terrible retreat of 120,000 men, which for various suffering and horror has no parallel in the annals of our race. Napoleon himself returned immediately to France, and was almost the first to announce his disaster in his own capital, so rapidly had he fled from the scene. The loss of the French and their auxiliaries in this campaign was 125,000 slain, 132,000 dead of fatigue, hunger, disease, and cold, and 198,000 made prisoners; yet the emperor had scarcely reached Paris when he issued orders for new conscriptions, and still thought of prosecuting the war. This dreadful reverse encouraged the European powers to a sixth coalition, composed of Russia, England, Sweden, Prussia, and Spain, which early in the year 1813 sent forward its forces toward the Elbe, with a view to hem in the indomitable general, who seemed to set every misfortune at defiance. With an army of 350,000 men, in great part young troops, Napoleon repaired to Germany, where he won the battle of Lützen on May 2, and the battle of Bautzen on the 20th and 21st, but neither with decisive results. On June 4 an armistice was agreed upon, when Napoleon repaired to Dresden, where Metternich on the part of Austria offered a mediation with a view to closing the war. But Napoleon would not agree to the terms which were proposed to

him, fixing the limit of the French empire at the Rhine, and hostilities recommenced. From Aug. 24 to 27 a battle raged around the city of Dresden, with the preponderance of success on the side of the French; but, owing to the want of cavalry, Napoleon was unable to derive from it all the advantages for which he looked. The greater part of the month of September was passed in a desultory warfare, the French armies on the whole losing ground, and experiencing constant desertions on the part of their German allies. It was no longer merely the governments who were opposing Napoleon, but the people; and the prestige of popular sympathy, which had carried him along, even in the midst of nominal enemies, was beginning to fail. To the German masses the war had become a war of independence. (For a more detailed history of the great campaigns of 1813-'14, see BLÜCHER.) On Oct. 16 the battle opened at Leipsic, and a gallant struggle on the part of the French showed that their energies were still fresh, and the genius of their leader unimpaired. The 17th was a day of anxious suspense and rapid preparation. On the 18th the carnage was renewed, and Napoleon discovered that it would be necessary to retire beyond the Rhine. The morning of the 19th saw the dejected lines of the French slowly filing out of the city, when the allies forced their way into it, and by blowing up a bridge committed a sad havoc, and made some 25,000 prisoners. Thus, after an obstinate resistance of three days, Napoleon was compelled to retreat—a movement for which, prodigious as his genius was in assault and defence, he seemed to have but little capacity. As at Moscow, and later at Waterloo, his backward march was worse than a battle lost. Though he cut his way bravely through the Bavarians, his late friends, at Hanau (Oct. 30), yet when he crossed the Rhine but 80,000 remained of all his splendid army. He reached Paris Nov. 9, to encounter a strong feeling of dissatisfaction on the part of his own countrymen. The legislative body expressed a desire for peace, and could only be answered by a guard of soldiers. Yet, with a fertility of resource and a genius for combination which were almost miraculous, Napoleon was prepared by the end of January, 1814, to enter upon another campaign, which is called the campaign of France. Prussia, Russia, and Austria were already on her eastern borders; Wellington had crossed the Pyrenees, and had laid siege to Bayonne; Bernadotte, crown prince of Sweden and late companion of the emperor, was coming down from the north at the head of 100,000 troops; and Murat, king of Naples, Napoleon's own brother-in-law, had entered into a secret treaty with Austria for the expulsion of the French from Italy. Thus surrounded on all sides by enemies, with his disposable force shattered and broken, the indomitable emperor still repulsed their attacks, and still continued to astonish Europe with dazzling achievements. But numbers as

well as moral power were now against him; the allies succeeded in reaching the exterior defences of Paris; the capital, which for so many years had dictated law to all other capitals, was obliged to capitulate; and on March 31 Alexander and his allies entered Paris amid the acclamations of the people. The senate, formerly his too servicable instrument, declared that "by arbitrary acts and violations of the constitution," Napoleon had forfeited the throne, and absolved all Frenchmen from their allegiance. His own generals insisted that he ought to abdicate, and on April 11 he signed his surrender of power. He was allowed the sovereignty of the island of Elba, with a revenue of 6,000,000 francs; and after taking leave of his army at Fontainebleau, he departed for his new abode. On May 4 he landed from the British frigate *Undaunted*, at Porto Ferrajo; and Louis XVIII. resumed the seat of his ancestors.—Ten months later, invited by a conspiracy of old republicans, joined to the Bonapartists, Napoleon, who had not ceased to watch and foment the intrigues of Paris, was secretly returning to France. Escaping from Elba, Feb. 26, 1815, he landed at Cannes, not far from Fréjus, March 1, with an escort composed of about 1,000 of his old guard. As soon as his arrival was known, parts of the army, sent against him under Colonel Labédoyère and Marshal Ney, joined his cause; and he made a triumphal progress toward Paris. Europe was overwhelmed with surprise at the suddenness of the apparition. On March 20, and before a shot was fired, Louis XVIII. was driven from the throne to which he had just been restored by the combined armies of the world. The congress of Vienna, still in session, heard the news with astonishment, and instantly concerted a plan for conjoint resistance. The armies resumed their march toward the French frontier. Napoleon, hastily reorganizing the government, but on a basis more liberal than that of the empire, and having in vain attempted to open negotiations for peace, advanced to the encounter. Drained as France was by a long series of desolating conquests, upward of 200,000 men went forward to meet more than double that number of enemies. On June 15 Napoleon had crossed the Belgian frontier with 124,000 men; the next day he defeated the Prussians under Blücher, at Ligny; and at the same time he sent Ney against the English army at Quatre-Bras, where he was checked by Wellington. On the morning of the 17th the latter fell back upon Waterloo, and on the 18th the final battle was fought. (See WATERLOO.) The French were thoroughly dispersed, and the great captain hurried back to Paris. Once more the capital was occupied by foreign troops, and now also stripped of the treasures of foreign art with which the conqueror had adorned it; a war which had lasted for 23 years was closed; the legislature demanded a second abdication; on June 22, just 100 days after his resumption of power, the second abdication was signed; and Napoleon was required to em-

bark instantly for the United States. But Napoleon, arriving at Rochefort with a view to fly, found that there would be little probability of escaping the vigilance of the British cruisers, and voluntarily surrendered himself to Capt. Maitland, of the British war ship *Bellerophon*. The British government ordered his detention as a prisoner, and finally consigned him to the island of St. Helena for life. He landed at his place of imprisonment Oct. 16, 1815, and remained there, alternately fretting at the restraints imposed upon him and dictating memoirs of his extraordinary career, till May 5, 1821, when he died of an ulcer of the stomach, the same disease which had carried off his father. On the 8th of May his remains were interred beneath some weeping willows, near a fountain in Slane's valley; but 20 years afterward the king of the French, Louis Philippe, procured the removal of his ashes to France, where they were deposited Dec. 15, 1840, beneath a magnificent monument, in the *Hôtel des Invalides*. — Napoleon's marvellous character and career have occupied numberless pens, and the most divergent judgments have been passed upon them; but he has almost universally been accorded the possession of unsurpassed military ability, of indomitable self-reliance, of prodigious energy, and of a lofty and commanding intellect. The bibliography of Napoleon forms a literature, and we can therefore refer only to a few of the leading works in French and English. The *Mémoires* by Bourrienne, the *Souvenirs historiques* by the duchess d'Abrantès, the *Mémorial de Sainte-Hélène* by Las Cases, and the "Voice from St. Helena" by Barry O'Meara, are widely known, as are also the biographies of Napoleon by Sir Walter Scott, Lockhart, and Hazlitt. Besides these we must mention the various complete and selected editions of *Œuvres de Napoléon*; *Recueil par ordre chronologique de ses lettres, proclamations, &c.* (2 vols., Paris, 1855); *Le consulat et l'empire* by Thiers (20 vols.), and *Le consulat et l'empire, ou Histoire de France et de Napoléon Bonaparte*, by Thibaudeau (10 vols.); the works of Montholon and Gourgaud, under Napoleon's dictation (respectively 4 vols. and 2 vols.); *Vie politique et militaire de Napoléon*, by Jomini (4 vols.); *Documents particuliers sur Napoléon: Cours diplomatique et politique, extrait du Moniteur* (7 vols.); *Mémoires pour servir à l'histoire*, by Savary (4 vols.); *Précis des événements militaires*, by Mathieu Dumas (19 vols.); "History of the Captivity of Napoleon at St. Helena, from the Letters and Journals of the late Lieut. Gen. Sir Hudson Lowe" (3 vols.). Among valuable later histories of Napoleon are those by Elias Regnault (4 vols., 1846), by M. de Norvins (4 vols., 21st ed., 1851), by Bégin (5 vols., 1853-4), by Baron Martin (de Gray), (3 vols., 2d enlarged ed., 1858), and by Pierre Lanfrey (Paris, 1867 et seq.; English, London, 1871). See further, *Correspondance de Napoléon 1^{er}* (32 vols., 1858-69, the latter part edited under Prince Napoleon's di-

rection as president of the committee of publication; abstract in German by Kurz, 3 vols., 1868-'70). — *Josephine* (MARIE JOSEPH ROSE TASCHER DE LA PAGERIE), first wife of the preceding, born at Trois-Îlets, Martinique, in June, 1763, died at Malmaison, near Paris, May 29, 1814. Her father derived his surname Pagerie from a family estate near Blois, whence he had emigrated to Martinique, to serve as a naval officer under the marquis de Beauharnais, then in command of that island. Her mother, Rose Claire des Verges de Sannois, belonged to a family which had likewise settled in the colonies. In December, 1779, she was married at Noisy-le-Grand, France, to the viscount de Beauharnais, then about 18 years of age. She went with her husband to Paris, where in the house of her mother-in-law, Mme. Fanny de Beauharnais, she became acquainted with literary society. Her grace and loveliness were admired, but the education which she had received at the convent of Port-Royal, adequate for colonial life, did not fit her for the society in which the viscount moved. The unhappiness arising from this cause was soon aggravated by the husband's gallantries and the wife's complaints. Beauharnais finally brought suit for divorce in 1785. After a trial lasting nearly a year the court exonerated Josephine from all charges, authorized a separation, and ordered the husband to provide for her support and that of her daughter, but awarded him the custody of the son. The whole Beauharnais family siding with Josephine, she took up her residence with her father-in-law, and in June, 1788, she visited her parents in Martinique. On her return to Paris in the autumn of 1790 she became reconciled with her husband, and after his imprisonment she was arrested herself while attempting to release him, and narrowly escaped sharing his death by the guillotine (1794). Mme. de Fontenay, afterward Mme. Tallien, one of her fellow prisoners, on recovering her liberty, procured the liberation of Josephine, and afterward the restoration to her of a portion of her husband's confiscated estates. Among the many stories of the origin of her acquaintance with Bonaparte, that relating to the application of her son Eugène for his father's sword, and Josephine's visit to thank him for his kindness to her son, is regarded as the most authentic. At this time she had removed from the rue de l'Université to a house in the rue Chantierine which she had purchased from Talma, and here she received many visitors, Bonaparte habitually spending his evenings in her society. She was married to him March 9, 1796, and in less than a fortnight afterward her husband went to the seat of war in Italy. She joined him at his request, but was appalled at the sight of the battlefield, and soon returned. Bonaparte continued in the midst of his arduous labors to address to her tender epistles, and to complain of her lukewarm return of his love. She was with him at

Montebello and Udine in 1797, and in the latter part of that year she resumed her receptions at Paris, and was now a recognized leader of society. She wished to follow him to Egypt, but he insisted on her going to Plombières for her health. During his absence he was prejudiced against her by his sisters and other relatives, and on his return to Paris overwhelmed her with reproaches; but she soon appeased him, and after this the smoothness of their intercourse remained unruffled. In the first years of the consulate Josephine was at the zenith of her career. Her receptions at the Tuileries and Malmaison acquired great celebrity, and by her invariable goodness she won the hearts even of opponents. Yet she felt oppressed by the paraphernalia of court life, and it was at Malmaison only, with its magnificent pleasure grounds and embellishments of her creation, that she found relief from the burdens of etiquette. These became still more distasteful after her accession as empress (May 18, 1804). Napoleon's sisters attempted to exclude her from the coronation, mainly on the ground of her not having borne children to her husband. Nevertheless, she was crowned together with him as empress of the French (Dec. 2), but not afterward as queen of Italy. Previous to the coronation, the religious ceremony of marriage, which had not been observed at the time of their union, was celebrated. She now saw much less of her husband than formerly, and his increasing neglect filled her with sad forebodings, which were fully confirmed after the battle of Wagram in 1809, when he decided upon a divorce. He had first intended to prepare her for this through the medium of her son Eugène, but on her indulging in bitter recriminations he broke it to her abruptly. The ceremony preceding the divorce took place on Dec. 15. Overcome by her emotion, she could not continue to read aloud the declaration of her assent, which had been drawn up for her, and was taken home almost lifeless. She was to remain in possession of her imperial rank and titles, and to receive an annuity of 2,000,000 francs. The emperor visited her repeatedly, and enabled her to keep up the semblance of a court at Malmaison, and after the capture of Paris she declared her willingness to join him at Elba, but was restrained by the fear of hurting the feelings of Maria Louisa. The czar Alexander offered his protection to her, and the king of Prussia and his son dined with her at Malmaison. She died of quinsy, and was buried in the church of Rueil, in a tomb of marble erected by Eugène and Hortense. Her first valet de chambre, Constant, described her as a lady of middle size, exquisitely shaped, and with an elasticity of motion which gave her an aerial appearance. She had magnificent hair and eyebrows and dark blue eyes, and her expression was full of sentiment and kindness. The fortune-teller Mlle. Lenormand published memoirs of her, which are regarded as utterly

worthless, and the *Histoire secrète* by Lewis Goldsmith is deemed to be equally untrustworthy. The statement in the *Mémorial de Sainte-Hélène* that she wished to impose upon the nation a supposititious child she indignantly denied, maintaining that on the contrary this subterfuge was constantly pressed upon her by others. The *Histoire de l'impératrice Joséphine*, by Joseph Aubenas (2 vols., Paris, 1857-'9), from authentic sources, throws a purer light upon her character. The *Lettres de Napoléon à Joséphine, et de Joséphine à Napoléon, et de la même à sa fille* (Paris, 1833), are also regarded as good authority; but the correspondence and memoirs published in 1819 have been denounced as apocryphal. —**Maria Louisa**, second wife of Napoleon I., born in Vienna, Dec. 12, 1791, died there, Dec. 18, 1847. She was the eldest daughter of the emperor Francis I. of Austria, by his second wife Maria Theresa, whose father was Ferdinand IV. king of the two Sicilies. Having been taught, like all her relatives, to execrate the name of Napoleon, she was at first appalled at the idea of marrying him; but resigning herself to her fate, she left Vienna on March 13, 1810. She met Napoleon near Soissons March 28. The civil marriage took place at St. Cloud, April 1, and the religious ceremony was performed next day at the Louvre by Cardinal Fesch. Most of the cardinals declining to attend, as the pope had not ratified the divorce from Josephine, they were banished from the capital and forbidden to wear their scarlet gowns, and hence they were called the black cardinals. Among the brilliant festivities of the marriage was a grand ball at the Austrian embassy, in the midst of which the building took fire and the empress was borne from the flames in the arms of Napoleon. She seemed at first to respond to her husband's warm affection, but she could not adapt herself to the society of the Tuileries, and her apathy and diffidence formed a striking contrast to her predecessor's vivacity. Her husband became still more attentive to her after the birth of a son in March, 1811. But she was as undemonstrative in her maternal as in all her other affections. She accompanied Napoleon to Dresden in May, 1812, where all the German princes paid homage to her. During the emperor's absence he appointed her regent, with a board to the decision of which she left the direction of public affairs. The emperor having ordered her to leave Paris on the entrance of the allies, she did not venture to disobey him, though urged by several of his relatives to remain at her post. She placed herself with her son under the protection of her father, and was easily persuaded to refrain from joining her husband at Elba. She never saw him again, and evinced no interest in his fate. The allies allowed her to retain for life the title of imperial majesty, and the congress of Vienna made her duchess of Parma, Piacenza, and Guastalla. After Napoleon's death in

1821, she contracted a morganatic marriage with Count Albert Adam von Neipperg, an Austrian general, then in his 47th year, who had been her chamberlain in 1815, and her reputed lover. He was divorced from his first Italian wife, by whom he had a son, who married Princess Mary of Württemberg. Maria Louisa bore him several children, and made him prime minister of Parma. He died April 22, 1829. During the disturbances in 1831 she was absent from her capital until order was restored by the Austrians; and shortly after the accession of Pius IX. in 1846, when a strong revolutionary excitement again pervaded Italy, she took her final departure from Parma. She was highly educated and attractive in person, her beauty being of the blonde Tyrolese style; but Lamartine properly characterizes her as a commonplace and motherly woman, fitted rather to shine in private life than to be associated with memorable events. Her fidelity was never suspected by Napoleon, who to the last regarded her as an incarnation of virtue and simplicity. See *Napoléon et Marie Louise, souvenirs historiques*, by Méneval; *Mémoires anecdotiques*, &c., by Bausset; and *Mémorial de Sainte-Hélène*, by Las Cases.—**NAPOLEON II.** (NAPOLEON FRANÇOIS CHARLES JOSEPH, duke of Reichstadt), son of Napoleon I. and Maria Louisa, born in Paris, March 20, 1811, died in Schönbrunn, July 22, 1832. He was baptized at Notre Dame by his grand-uncle Cardinal Fesch. The archduke Ferdinand represented the emperor of Austria as godfather, and his godmother was Madame Lætitia. His father bestowed upon him the title of king of Rome, and on his abdication designated him as his successor to the imperial throne as Napoleon II., and he was recognized as such by the executive committee appointed by the chambers previous to the final accession of Louis XVIII. in 1815. The countess Montesquiou, the governess of the young prince, accompanied him to Austria, where his education was perfected under the direction of Count Maurice Dietrichstein. The right of succession to his mother's dominions in Parma being withdrawn from him in 1817, the emperor of Austria conferred on him in July, 1818, the rank of an Austrian prince with the title of duke of Reichstadt, and provided him with eminent teachers, Metternich being charged with the superintendence of his studies. The feeble efforts made after the revolution of 1830 in his favor were altogether unavailing, but the prince became more and more interested in the history of his father's military career, and Mar-mont, whom he met at the English ambassador's house in Vienna, gave him for three months a course of instruction on the Napoleonic campaigns. His military training having been the object of special care, he rapidly passed through various promotions, and in 1831 he commanded as lieutenant colonel one of the Hungarian infantry regiments of Vienna. He died of laryngeal phthisis, in the same room in

which his father had dictated peace to Austria, and was buried in Vienna in the vaults of the Austrian imperial family, in the church of St. Augustine. His eyes, remarkable for depth and brilliancy, reminded one of those of his father, and in his placid and amiable disposition he resembled his mother. On the establishment of the second empire in 1852, he became known as Napoleon II. in the order of imperial succession. His biographers are De Montbel (Paris, 1832-'3), Lecomte (de la Marne, 1842), Guy (de l'Hérault), and J. de Saint-Félix (1856).

BONAPARTE, Napoleon III. (CHARLES LOUIS NAPOLEON, popularly known as LOUIS NAPOLEON), born in Paris, April 20, 1808, died at Chiselhurst, England, Jan. 9, 1873. His mother, Hortense de Beauharnais, had for some time lived apart from her husband, King Louis of Holland, and his paternity was questioned. It has been ascribed to the Dutch admiral Verhuel, and King Louis himself only reluctantly acknowledged the new-born as his son at the imperative request of Napoleon I., who stood as godfather, and Maria Louisa as godmother, at the baptism, which was administered by Cardinal Fesch at Fontainebleau, in November, 1810. Hortense selected the abbé Bertrand as her son's governor, Philippe Lebas, a thorough republican, as his principal preceptor, and Col. Armandi became his military instructor. Accompanying his mother to Switzerland and Germany, he familiarized himself at the gymnasium of Augsburg with the German language and literature, and applied himself especially to the study of history and mathematics. From 1824 to 1830 he was with Hortense at Arenenberg. Gen. Dufour having perfected his military training, he became an officer in the Swiss army, and in that capacity was regarded as an adopted citizen of that country. Louis Philippe refusing to allow him to reside in France, he joined the patriots in Italy, where his brother died at Forlì, while he, escaping to Ancona (1831), was prostrated there by a severe illness. He finally reached Paris after great perils, but, being ordered to leave, returned with his mother to Arenenberg. Subsequently he was about to engage in the Polish war of independence, the command of the revolutionary army having been tendered to him, when the fall of Warsaw put an end to that project. A new application to the French government led only to a renewal of the decree of banishment, especially as the death of the duke of Reichstadt in 1832 made him Napoleon's heir, according to the precedence accorded in the emperor's will to the children of Louis and Hortense, of whom he was then the only surviving son. He now devoted himself to literary labors, which kept him before the public as a philosophical writer on political and social subjects, and as an advocate of universal suffrage as the basis of imperialism. In 1836 he covered himself with ridicule by an abortive attempt to overthrow the French government, begun at Strasburg

(Oct. 28-30), which resulted in his arrest and detention at the citadel of Lorient till Nov. 21, when he was conveyed to Brazil, and thence in January, 1837, to New York, where he lived for some time in pecuniary embarrassment. He was at Arenenberg at the time of his mother's death, in October, 1837, after which he voluntarily left Switzerland in order to avoid involving that country in a contest with Louis Philippe, who had insisted on his being expelled. He took up his residence in London, surrounded by partisans, most of whom reaped in the subsequent days of his prosperity the reward of their devotion to him in his adversity. He associated much with the countess of Blessington and Count d'Orsay, and with a number of the English nobility; but pecuniary distress and his political designs affiliated him with less select members of society. His principal mistress was Mrs. Howard, who bore him several children, and for whom he afterward provided handsomely; and while in London he was for the first time introduced by Count Bentivoglio, brother of the countess Walewska, to Eugénie, his future wife. He enlisted support in the press for his imperialistic theories, and published in 1839 the *Idees Napoléoniennes*. His tenacity of purpose and impenetrable bearing, savoring rather of the Teutonic than of the Latin race, had impelled his mother to call him *le doux entêté*, in allusion to his being at the same time placid and stubborn, and gave him special qualifications for the mission of a conspirator. He embarked in August, 1840, for the continent, with the purpose of regaining the French throne; but this enterprise ended as absurdly as the attempt at Strasburg. With Montholon, a companion of Napoleon I. at St. Helena, and about 50 followers, he landed near Boulogne in the night of Aug. 6, displaying a tame eagle; but he failed to rouse the enthusiasm of the troops, and was again arrested, and two months later sentenced by the chamber of peers, despite Berryer's eloquent defence, to perpetual imprisonment. He was confined in the fortress of Ham, where Montholon and Dr. Conneau shared his captivity and assisted him in preparing various publications. Being selected by several Central American states as the president of a projected Nicaragua canal, an application for his release was made in 1846, to which the illness of the ex-king Louis gave additional weight; but Louis Philippe declined to grant the request, and the prince made his escape from Ham (May 25) in the dress of a working man, with the assistance of Dr. Conneau, and reached England. The French ambassador in London, however, refused to provide him with a passport, and he was prevented from attending his father's deathbed. He remained in London till the outbreak of the revolution of Feb. 24, 1848, when he hastily left for Paris, but at the request of the provisional government he went back to England. He repeatedly declined to accept nominations to the constituent assembly, in order, as

he alleged, not to embarrass the government; but being elected by large majorities in Corsica and in three other departments, including that of the Seine, he finally accepted the latter election, which was ratified by the assembly (June 12), despite the decree of the executive commission for his continued banishment. But on his declaring to the president of the assembly "that he would know how to fulfil the duties which the people might choose to impose on him," a popular excitement arose, and he returned to London, resigning his seat. After the sanguinary conflict of June, however, finding himself again reelected by the departments of the Seine, Yonne, Charente-Inférieure, Moselle, and Corsica, he took his seat (Sept. 26) in the constituent assembly, which speedily revoked the decree of banishment. Yet he was distrusted, and an amendment was introduced (Oct. 9) with a view to exclude him from the presidency of the republic. On this occasion he made his first speech, his excessive tameness and composure creating an unfavorable impression, and Thiers called him a wooden head (*tête de bois*). To subsequent attacks he offered the same reserve and silence, declaring that he preferred to show his devotion to France by actual services rather than by rhetoric. He maintained the same attitude during the presidential election, listening to everybody without unbosoming himself to anybody, and seeking to conciliate all parties without identifying himself with any. On Dec. 10, 1848, he was elected president of the republic for four years by 5,434,226 votes, according to the official announcement on the day of inauguration, Dec. 20, Cavaignac, his principal competitor, receiving only 1,448,107. Odilon Barrot became the head of the cabinet; Drouyn de Lhuys, minister of foreign affairs; Falloux, of public instruction; Bixio, the only one who had not been a monarchist, of agriculture and commerce, but retired within eight days; and M. de Maleville, of the interior, who was speedily dismissed, mainly because he had failed to hand over instantly to Louis Napoleon all the telegraphic despatches addressed to him. The sincere republicans soon fell out with the president, on his determining to close political clubs and adopting other reactionary measures. A French army under Oudinot was sent against the Roman republic, and after some combats entered Rome July 3, 1849. Although this project had been initiated by Cavaignac and approved by the assembly, the ultra republicans, under the lead of Ledru-Rollin, attempted to impeach the president on account of this intervention; but his course was approved by the majority. The attempt at insurrection made on June 13 was promptly quelled; but he exasperated the extreme left by proclaiming martial law in Paris, forbidding political meetings, and instituting legal proceedings against the representatives implicated in those disturbances; while at the same time he incurred the displeasure of the conservatives by

seeking to condone for this rigor by releasing over 1,300 persons who had participated in the outbreak of the preceding year. The accession of a number of ultra-republican members in 1850 increased the disappointment of the conservatives, and on May 31 they passed a law restricting the universal suffrage which had made Louis Napoleon president; and they further marked their hostility by grudging him an increased allowance, and by appointing a permanent committee to watch over the public interests during the recess of the legislature. This permanent committee was composed exclusively of conservatives; and while several of their leaders conferred with the count de Chambord in respect to a fusion of the two branches of the Bourbons, Louis Napoleon courted popularity with the masses and the army. After a demonstration in his favor by the troops at Satory, near Versailles, Changarnier issued an order prohibiting such manifestations, which the president resented by removing him from the military command of Paris (Jan. 9, 1851), whereupon the assembly passed a vote of censure against the administration. This led to the formation of a new cabinet and to a conciliatory message, which, like most of Louis Napoleon's state papers, was pervaded with a peculiar philosophical vein of thought; but a majority again declined to accord him a larger allowance, and their ill feeling against him was greatly increased by the petitions pouring in from all parts of the country demanding an extension of the presidential term, and by Louis Napoleon's speeches at Dijon and other places, in which he assumed to be the providential protector of France against both legitimists and socialists. Many of the provincial authorities protested against the rejection by the majority of the proposed revision of the constitution for the extension of Louis Napoleon's term of office; and in this conflict between the assembly and the numerous Bonapartists among the people, the president ingratiated himself still more with the latter by proposing, in addition to the abrogation of the law of May 31 restricting the suffrage, the exercise of the franchise after only six months' residence in the place of voting. These measures were rejected by the assembly, and a resolution was at the same time introduced tending to place the military forces of the capital under the control of the president of that body. This capped the climax of the contest, and Louis Napoleon immediately appointed a new prefect of police, M. de Maupas, and a new commander, Magnan. The latter selected a new corps of officers, composed of devoted Bonapartists, and the president declared that in a crisis he would not, like previous chiefs of state, follow the army, but expect it to follow him. The assembly, torn by party wrangling, was unable to concert measures for the defence of the constitution, while the president matured his schemes. Finally, on Dec. 2, 1851,

Louis Napoleon, assisted by Persigny, Morny, Saint-Arnaud, Magnan, Maupas, and other life-long adherents, overthrew the assembly by military force and took possession of the whole government. During the preceding night and early in the morning of that day about 180 members of the two extreme parties were placed under arrest, and some of them at once sent out of the country; the national assembly was declared to be dissolved, and its place of meeting was guarded by soldiery; universal suffrage was proclaimed, and Paris placed in a state of siege. Several members of both parties in the assembly hastily assembled, but in vain, to protest against the usurpation, and declare the president deposed; resistance was attempted, but without concert or plan, and chiefly resulted in deluging the principal boulevards with the blood of innocent spectators, shot down by the soldiery under Canrobert and others (Dec. 4). Louis Napoleon had made such effective preparations that order was speedily restored. His appeal to the people in the general elections (Dec. 20-21) resulted in the confirmation of his usurpation and his election to the presidency for ten years, by over 7,000,000 against less than 1,000,000 negative votes. He promulgated a new constitution, Jan. 14, 1852, reaffirming the principles of 1789, and declaring organic changes in the form of government to be admissible only by the consent of the people; and on March 28 he relinquished the dictatorship which he had assumed since the *coup d'état*, to resume the office of president. But it soon became manifest, especially from his intimations at Bordeaux on Oct. 9, that he was again bent on disregarding his pledged faith to the republic. The senate, obedient to his behests, voted almost unanimously on Nov. 7 in favor of the restoration of the empire, and he resorted once more to his favorite measure of appealing to the people. The voice of the senate was ratified, Nov. 21-22, by nearly 8,000,000 votes; and on Dec. 2 he ascended the throne as Napoleon III., hereditary emperor of the French, by the grace of God and by the will of the nation. On Jan. 22, 1853, he informed the legislature that, after having become the peer of the anointed heads of old monarchies by the force of new political principles, it would be hardly dignified to gain an artificial admission to their families by intermarriage; and uttering such democratic reflections, he announced his approaching marriage with Eugénie Marie de Montijo, which union was celebrated on Jan. 29 and 30. Although he had won supporters by declaring peaceful intentions, this illusion was speedily dispelled by the Crimean war, in which he embarked with Great Britain, Sardinia, and Turkey. It was alleged that, as the emperor Nicholas had declined to address him as his brother, as is usual among sovereigns, he was the more anxious to join in the war, which resulted in the defeat of Russia. The treaty of peace of March 30, 1856, was concluded in Paris under

the auspices of Napoleon, who came out of this contest with enhanced prestige. The birth of the prince imperial on March 16 increased the festivities of the court, while a large concourse of visitors to the capital added to the commercial prosperity which he had from the first sought to promote, especially by providing occupation for the discontented poor in new public works. He exchanged visits with Queen Victoria, had a friendly interview with the czar in September, 1857, and became the principal mediator between Switzerland and Prussia in the Neuchâtel question. At the same time he gave greater prominence to the navy, and dazzled the public mind by his occupation of New Caledonia and by joining England in the warfare against China, and subsequently by expeditions to Japan and Cochin China, the last resulting in conquest. Attempts had been made upon his life by Pianori and Bellamare in 1855; and another was made in January, 1858, by Orsini and others, chiefly Italians, on the very eve of Napoleon's interference in favor of Italy. Cavour, who had cultivated excellent relations with him during the negotiation of the treaty of Paris in 1856, met him again at Plombières in August, 1858; and on the following new year's day, when the diplomatic corps presented their respects to the emperor, he created a great sensation in Europe by abruptly expressing his regret to Baron Hüner, the representative of the emperor Francis Joseph, at the altered relations between Austria and France. This was followed at the end of the same month (Jan. 30, 1859) by the marriage of the princess Clotilde, daughter of Victor Emanuel, with Prince Napoleon, and in May by the emperor's formal declaration of war against Austria, which had taken the initiative in attacking Sardinia, while Francis Joseph denounced Napoleon as a revolutionary firebrand. Setting out for the seat of war with the avowed purpose of making Italy free from the Alps to the Adriatic, Napoleon nevertheless brought the contest to an incomplete termination while flushed with the brilliant victories at Magenta (June 4) and Solferino (June 24), and he personally arranged with the emperor of Austria the preliminaries of peace at Villafranca (July 11), mainly resulting in the nominal cession to France of Lombardy, which was at once transferred to Victor Emanuel. This abrupt peace, when it was generally expected that the war would be followed up by the total extirpation of Austrian domination in Italy, was ascribed to his anxiety to close the conflict before the aid of Prussia should enable the enemy to turn the tide of success, to the complications growing out of the continued protection of Rome by the French army, and to a certain reluctance to make Italy too powerful. Cavour, however, despite the stipulations of Villafranca, which were confirmed by the treaty of Zürich (November, 1859), opposed the plan of an Italian confederation proposed by Napoleon, and insisted upon the establishment of the

kingdom of Italy. While ostensibly attempting to have the Italian question settled peaceably by liberal reforms on the part of the pope and the king of the Two Sicilies, and by a congress of sovereigns in Paris, Napoleon allowed Victor Emanuel to extend his dominions; and his tacit connivance with the aggrandizement of Italy was rewarded in 1860 by the cession of Savoy and Nice to France. This led to a protest on the part of Switzerland, and revived in Europe generally suspicions of aggressive designs on his part, though in an interview with the German potentates on June 15, 1860, he strove to allay these apprehensions. Great Britain was now more friendly disposed to him than most other powers, especially as he lost no opportunity to ingratiate himself with Englishmen individually, and concluded in the same year with Cobden personally a commercial treaty in the interest of free trade. This measure, however, alienated from him the good will of the protectionists in France, and was abandoned after his downfall. He also lost ultramontane supporters by his Italian policy, by the suppression of the society of St. Vincent de Paul, by the appointment of M. Renan to a professorship, and by other measures which pleased the liberals, whom he further propitiated by removing (Nov. 30, 1860) some of the restrictions on elections, and enlarging the scope of the legislature and the liberties of the press. The Anglo-French war in China was brought to a successful termination by the capture of Peking in October, 1860; and his prestige in the East was increased by the expedition to Syria (1860-'61), for protecting the Christian populations against a renewal of the Damascus massacres. The emperor was at the zenith of his prosperity at the time of the outbreak of the civil war in the United States. As this had a disastrous effect upon French industry and commerce, short crops aggravating the situation, Napoleon surrendered in favor of the legislature, at the urgent request of Minister Fould, his previous absolute control of the treasury. He recognized the belligerent rights of the Confederate States, but officially informed the United States government (May 16) that he did not consider this as recognizing the former as an independent power. Ostensibly he assumed a conciliatory attitude toward the United States, and repeatedly offered his friendly services for the restoration of peace. He entertained, however, officious relations with the Confederate agents, who claimed to have many influential friends of their cause at the imperial court. An expedition projected in June, 1861, by France, England, and Spain, avowedly to obtain material guarantees for claims against Mexico, degenerated after the withdrawal of the two latter powers (April, 1862), under Napoleon's sole direction, into a war of conquest against that republic; and in April, 1864, he established the Hapsburg prince Maximilian on the throne of Mexico as emperor. This was rep-

resented as the initiation of Napoleon's proposed supremacy of the Latin race, of which he wished to become the arbiter in the new world as in the old; but the increasing victories of the United States made him afterward disclaim all purpose of territorial acquisitions. At home he continued to make himself acceptable, especially to the money-making classes, officeholders, contractors, and speculators, who profited by military and naval expeditions, by railways, and by all the other stupendous enterprises of the period; and the embellishment and enlargement of the capital gave employment to many paupers, while little or nothing was done for the mental and moral elevation of the masses, and the whole aim of the emperor seemed to be to dazzle by splendor and luxury, and by material grandeur at home and visions of glory abroad. But the drain upon his military resources in Mexico was regarded as paralyzing his strength for the contingency of war in Europe, and at the same time made, together with the other costly expeditions, heavy inroads on the treasury. He began also to feel uneasy at the increasing power of Prussia; and to counteract her *entente cordiale* with Russia, he warmly advocated in 1863, in union with England and Austria, the treaty rights of Poland; but as these powers declined to join him in ulterior measures, England especially refusing to take part in a congress which he proposed for the settlement of this and other questions, he had to content himself with a barren declaration of sympathy for the Polish patriots. While his political situation in Paris was compromised by official tampering with the elections, and by the greater dignity imparted to the opposition in the *corps législatif* by the accession of Thiers, Berryer, and other influential statesmen, he was obliged to remain a passive spectator of the Schleswig-Holstein war and the consequent aggrandizement of Prussia. After having at first made an unavailing effort to prevent this war by mediation, he withdrew (January, 1864) from a conference of the powers at London, disguising his dissatisfaction with the progress of these events by pretending to encourage the application of his theory of nationalities in favor of the Schleswig-Holstein people shaping their own destinies. The ignominious end of the Mexican expedition, from which the cabinet of Washington had urged him to withdraw, especially after the termination of the civil war in 1865, and the Prusso-Italian coalition against Austria in 1866, which he resented by denouncing the obsolete character of the treaty obligations of 1815, inflicted still greater injury upon his prestige; while the independence of Italy from France was further exhibited by Napoleon's withdrawal of his troops from Rome at the end of 1866, in accordance with the convention of 1864. His participation in the peace negotiations between Austria and Italy after the overwhelming defeat of the former power by the Prussians at Sadowa (July 3), resulted in the

nominal cession of Venetia to France and in its immediate transfer by Napoleon to Victor Emanuel; but this afforded a poor consolation for the loss of influence, which had passed from his hands to those of Germany, under the lead of Prussia. The parliamentary opposition, led by Thiers, increased in proportion to his vanishing repute, and the blunders of his foreign policy as well as the maladministration of financial affairs were unsparingly exposed. His repeated efforts in the course of 1866 to recover his lost ground by acquisition of German or Belgian territory, in consideration of his allowing Prussia to take the lead in united Germany, were unavailing against Bismarck's opposition; and he was also disappointed in his hope of creating a division between the South and North German states; so that all he could obtain after a grave conflict with Prussia in relation to Luxemburg, and subsequent negotiations with Holland for the acquisition of that territory, was its neutralization at the conference of London (May, 1867). He endeavored nevertheless to explain away in his message to the legislative body the dangers of German consolidation, but proposed at the same time a considerable increase of armaments. The execution of Maximilian in June, 1867, shortly after the departure of the last French troops from Mexico, became known in Paris at the time when Napoleon was entertaining, during the great exposition, almost all the crowned heads of Europe, including the sultan and the czar. The emperor went to Salzburg in August to condole with Francis Joseph on the tragical death of Maximilian, and this interview was regarded as a pledge of more intimate relations between the two emperors. He soon afterward sent French troops to Rome for the protection of the pope against the Garibaldians, and insisted upon Victor Emanuel's joining his efforts in conformity with the convention of 1864; but the emperor's subsequent appeal to the European powers to settle the Roman question by a congress in Paris was not heeded. Despite his constant manipulation of public opinion, the general elections of 1868 showed a defection of 200,000 voters since 1863; and the new press law, adopted after stormy debates, and regarded as affording somewhat greater liberty, resulted only in increasing the clouds that had been gathering round his throne and in the creation of many new journals, the most conspicuous of which in its invectives was Rochefort's *Lanterne*, whose first nine weekly issues reached a circulation of over 1,150,000. Other journals were almost equally bold, though much more decorous; and 64 editors were sentenced to imprisonment between May 11 and Dec. 31, 1868. According to the new law of Feb. 1, 1868, the military force, including the mobile guards, was brought up to 1,350,000 men. Yet on opening the new legislative session on Jan. 18, 1869, the emperor boasted of his friendly relations with foreign powers and of the prosper-

ity of the country. More than ever in need of the support of the masses, he followed up his various measures for the working classes by suppressing early in 1869 the *livrets* or service books which had subjected artisans to vexatious formalities. The controversy with Belgium in regard to the transfer of a Belgian railway to a French company, which for a time threatened complications, was amicably settled in April, but great agitation continued to prevail in Paris. The new elections at the end of May were attended with tumults in many localities, the opposition carrying Paris, Lyons, Marseilles, and other cities, though the official influence in the interior, together with the votes of the peasantry and part of the clergy, resulted in an aggregate vote in favor of Napoleon. Thiers, Favre, and Simon, however, were reelected; Gambetta, Bancel, and Raspail were returned to reinforce the ultra radicals; and Rochefort himself was finally elected in one of the metropolitan districts, at the same time with Crémieux and Emmanuel Arago; while Émile Ollivier, a former liberal who had adhered to Napoleon, was defeated in Paris, and had to accept a seat for one of the departments. The aggregate of votes cast for the emperor had dwindled down to less than 5,000,000, while the opposition, including those opposed to personal government though in favor of a constitutional empire, exceeded 3,000,000. Riotous demonstrations ensued (June 7-11) in Paris and other cities, amid acclamations in favor of a republic and against Napoleon. Over 1,000 persons were arrested, and the military had to restore order in Paris, Nantes, and Bordeaux. To calm the excitement, the emperor proposed liberal changes (July 12) after the opening of the legislative body; dismissed Rouher, his strongest partisan, from the ministry; appointed a new cabinet to mark the transition from personal and arbitrary to the new projected parliamentary and constitutional government; and promulgated an amnesty for political exiles, which measure resulted in bringing back to France some of his most inveterate enemies. The *senatus consultum* embodying the new reforms was adopted Sept. 6; but the emperor would not convoke the new session on the day prescribed by the new law. The opposition, led by Favre, proposed to take the initiative in opening it; but in view of the public exasperation, they limited their demonstration to the issue of a protest (Oct. 18) against what they characterized as Napoleon's new insult to the nation, and calmly awaited the inauguration of the legislature by the emperor himself, which took place Nov. 29. Ollivier now came forward as the principal spokesman of the new constitutional régime, with about 120 followers, the rest of the members being divided among the various shades of conservatives and radicals. In his exposition of foreign policy the emperor expatiated on the advantages of the Suez canal, which he had labored to promote, and on the Egyptian-

Turkish complication, in regard to which he sided with England in maintaining the rights of the sultan without compromising the interests involved in the authority of the khedive. Ollivier became prime minister on Jan. 2, 1870, and one of the first measures of the new administration was to remove Haussmann, whose administration of the prefecture of the Seine and stupendous enterprises had contributed greatly to the embellishment and enlargement of Paris, but also to the detriment of integrity and financial stability, and to the disadvantage of the poor, whose humble dwelling places had been pulled down to make room for new boulevards and squares; while Odilon Barrot was appointed chairman of the committee of decentralization. Additional odium was cast upon Napoleon by the assassination of Victor Noir by Prince Pierre Bonaparte, and by the latter's acquittal of the charge of murder at Tours, March 27. Yet he received an affirmative vote of over 7,000,000 on the *plébiscite* of May 8, in approbation of his reform measures, although Paris returned over 180,000 adverse votes, including those of many soldiers, and the majority in most of the large cities remained equally hostile to the emperor. Uneasiness in regard to foreign relations was revived by the appointment as minister of foreign affairs of the duke de Gramont, who while French ambassador in Vienna had been noted for his hostility to Prussia. Ollivier nevertheless persisted (June 30) in reassuring the country in regard to uninterrupted friendly relations with foreign powers. Great excitement, however, prevailed shortly afterward, when it became known that the crown of Spain had been offered to Prince Leopold of Hohenzollern, a relative of the king of Prussia, and both Ollivier and Gramont declared (July 6) in the legislative body that such a candidature, agreed upon without the knowledge of the French government, would be injurious to the honor and the influence of the French nation. The emperor instructed Benedetti, his ambassador in Berlin, to require King William, who was at that time (July 9) at Ems, to prohibit Prince Leopold from accepting the Spanish crown. Despite the latter's voluntary withdrawal, the emperor was not satisfied, and insisted upon a personal pledge from the king of Prussia that no prince of Hohenzollern would be in future a candidate for the Spanish throne. It now became manifest that the emperor, despairing of sustaining his power at home and of recovering his standing abroad, was bent on retrieving his fortunes on the battlefield, and on wreaking revenge upon Prussia for the success by which she had exalted the glory of Germany and dimmed that of France. Bismarck, the Prussian prime minister, declined to submit the emperor's new pretensions to the king; and as Benedetti was nevertheless instructed to intrude them upon the Prussian monarch personally, the latter declined to give another

interview to Napoleon's representative. The next day (July 14) Benedetti was recalled by the emperor, and Baron Werther from Paris by the Prussian king. Preparations for war were immediately made on both sides. The Germans manifested the wildest enthusiasm in resenting what they called the arrogance of France, and, contrary to Napoleon's expectations, the South German states promptly declared their readiness to join the North German confederation. The mediation of England, offered by Lord Loftus, the British ambassador, was declined in Berlin until Napoleon should first accept it; and a subsequent mediatorial effort of Pius IX. likewise fell to the ground. Napoleon took the initiative by formally declaring war on July 19 through his chargé d'affaires Le Sourd, basing his declaration, first, upon the insult offered at Ems to Count Benedetti, the French minister, and its approval by the Prussian government; secondly, upon the refusal of the king of Prussia to compel the withdrawal of Prince Leopold's name as a candidate for the Spanish throne; and thirdly, upon the king's persistence in giving the prince liberty to accept the throne. The extraordinary military appropriations demanded by the emperor were unanimously accorded by the senate, and with but a few dissenting votes by the legislative assembly; but as considerable time was lost in the preparations, the Germans were left at liberty to concentrate overwhelming forces on the French frontier, King William leaving Berlin on July 31, three days after Napoleon's departure for Metz. The first movement of importance began on Aug. 2, when Gen. Frossard, with about 30,000 men, advanced from St. Avold against Saarbrück. On the advance of the French, the small Prussian garrison of that city retired to the adjoining heights, and was compelled to withdraw to the right bank of the Saar. On taking possession of the heights, but not of the town of Saarbrück, the emperor sent to Eugénie, whom he had left in Paris as regent, a sensational despatch containing a grandiloquent passage on the prince imperial's baptism of fire. But grotesque as this announcement was, it was the only one sent by him that did not savor of defeat. The successive German victories creating great commotion in Paris, he was soon obliged (Aug. 8) to relinquish the command of the armies, and after a few days spent with Bazaine he joined MacMahon at Châlons. The corruption which had infected the public service of the empire had impaired the efficiency of the military organization, and the generals, mainly trained in the warfare against Arabs in Algeria, could not cope with the superior organization of the Germans. Napoleon was overwhelmed by defeat after defeat, and on Aug. 31 he issued at Sedan his last proclamation to the army, exhibiting, though striving to conceal, his desperation. He had already a few days before provided for the safety of the prince imperial by sending him to Belgium; and in the afternoon

of Sept. 1, when the French were everywhere beaten, Wimpffen proposed to the emperor, who was said to have deliberately exposed himself to death in the thickest of the fight, to save himself from capture by breaking through the German lines at Carignan. Napoleon would not risk the lives of the soldiers in what he regarded as a hopeless attempt, and also declined to accept Wimpffen's resignation. Soon after 5 P. M. he sent a colonel with a white flag to the headquarters of the enemy. Suddenly the firing ceased. The Germans shouted, "Victory! the emperor is there." The king of Prussia sent Lieut. Col. Bronsart to Sedan to demand an unconditional surrender, upon which the emperor despatched his aide-de-camp, Gen. Reille, to the royal headquarters with the following letter: "My brother: Since it has not been vouchsafed to me to meet death at the head of my troops, I surrender my sword to your majesty." In order to obtain if possible more lenient conditions of capitulation than the Germans were disposed to accord, the emperor left Sedan at 5 A. M. on Sept. 2, Bismarck hastening to meet him on the road between Sedan and Donchéry, in a small house near the latter place. The king, however, consented to see the emperor only after the ratification of the capitulation between Moltke and Wimpffen. Preceded by an honorary escort of Prussian cuirassiers, and accompanied by Bismarck, the emperor had the same night an interview of about 15 minutes with the king of Prussia at the castle of Bellevue, near Frénois, and the victor assigned to his captive the castle of Wilhelmshöhe, near Cassel, as a residence. He left Bellevue on the morning of Sept. 8 for the Belgian frontier with a Prussian escort, the Belgian general Chazal escorting him to the German border; and in the evening of Sept. 5 he arrived at Wilhelmshöhe. During his residence there the empress of Germany showed him many delicate attentions. On the news of the emperor's capitulation Jules Favre at once proposed his deposition in the legislative body, and in the confusion which ensued during the proclamation of the republic (Sept. 4) the empress regent fled to England. Napoleon protested (March 6, 1871) against the decree of the national assembly at Bordeaux of March 1, which confirmed his expulsion and that of his dynasty from the throne, and made him responsible for all the calamities of the war and for the dismemberment of France. He was released by the emperor William on March 19, and joined Eugénie and the prince imperial at Camden house, Chiselhurst, where he was temporarily buried. On May 12, 1872, he wrote to Gen. Wimpffen assuming the sole responsibility for the surrender at Sedan; and a pamphlet entitled *Des causes qui ont amené la capitulation de Sedan, par un officier attaché à l'état major général* (Brussels, 1870), has been ascribed to him. Queen Victoria, and especially the prince of Wales, and the English generally, with whom he had always been popular personally, soothed his exile

by considerate attentions; and his funeral was numerously attended by the English and by French partisans of his dynasty. He published *Histoire de Jules César* (2 vols., 1865-'6), which is still unfinished; and his miscellaneous writings are contained in *Œuvres de Napoléon III.* (5 vols., 1854-'69), *Œuvres militaires* (3 vols., 1856), and *Œuvres posthumes* (1878).—See *Histoire du second empire*, by Taxile Delord (vols. i. to iii., 1869-'72), and *Napoléon III., eine biographische Studie*, by Gottschall (2d ed., 1871). The best known publications adverse to Napoleon are Victor Hugo's *Napoléon le Petit* (Brussels, 1852), and *Les propos de Labiénus*, by Prof. Rogeard (Paris, 1865).—**Eugénie Marie de Montijo**, wife of the preceding, born in Granada, May 5, 1826. Her father, Count Montijo, who died in Madrid in 1839, was a grandee of Spain, whose origin has been traced to the Porto-Carrero family of Genoa, which, after settling in Spain in the 14th century, formed connections with many illustrious houses, whence Eugénie inherited numerous Spanish titles of nobility. Her mother, Maria Manuela Kirkpatrick Closeburn, was descended from a Roman Catholic family of Scotland who sought refuge in Spain after the fall of the Stuarts. After spending her childhood in Madrid, Eugénie was sent to school in Toulouse and Bristol, and travelled much with her mother under the name of Countess Teba, residing some time in London. Her beauty, grace, and accomplishments having attracted the attention of the future emperor during his residence in England, she became his wife, Jan. 29, 1853, and contributed greatly to the brilliancy of the imperial court. She prevailed upon the municipality of Paris to devote a wedding present of the value of 600,000 francs, intended for her, to the endowment of a female college, and further devoted to charities 100,000 out of 250,000 francs presented to her by her husband on the same occasion. She gave birth to the prince imperial March 16, 1856, and the prospective right of regency was conferred on her in February, 1858. Her support was courted by the ultramontanes in respect of the Italian and Roman questions and the Mexican invasion; and in 1865, while her husband was in Algeria, her position as regent was complicated by Prince Napoleon's hostility to the pope, to whose interests she was zealously devoted. After having in previous years accompanied her husband to the English court, she went with her son to Corsica in 1869 to attend the inauguration of the monument of Napoleon I.; and in October of that year she set out on a journey to the East by way of Venice to attend the opening of the Suez canal, receiving great attentions everywhere. In the same year she endowed the geographical society of Paris with 200,000 francs as a foundation for an annual prize of 10,000 francs to the most eminent French explorer or discoverer. She assumed the regency after the emperor's departure for the seat of war in 1870, and received the first news of his surrender at Se-

dan through Prince Metternich, the Austrian ambassador, whose wife was one of her most devoted friends, and formerly conspicuous, with the empress, Mme. de Pourtales, Mme. de Gallifet, and other brilliant women, among the most famous leaders of gay and fashionable entertainments. She received no tidings either from her minister Palikao or from her husband; but Pietri, the prefect of police, in the afternoon of Sept. 8, warned her of the insecurity of her position, and his despatch was still on her table when a few hours after her departure the mob invaded her apartments. Metternich urged her to flee in the most pressing manner, and the Tuileries was in the greatest confusion when she left the palace after midnight, deserted by her attendants and accompanied by Metternich, the Italian minister Nigra, the countess Walewska, M. de Lesseps, and her aged secretary, Mme. Lebreton. Plainly attired, the empress was recognized only by a boy, whose exclamation passed unnoticed, and she entered a public carriage in a street near the imperial residence, at the same moment when a crowd of nearly 1,000 persons passed by her uttering violent outcries against the emperor. Eugénie, the countess Walewska, Prince Metternich, and one of the latter's attachés rapidly drove to the railway station, intending to proceed to England. After spending a few days with the Hagvorst family near Brussels, the ex-empress proceeded to Ostend and Dover, and thence to Hastings, where she met her son, with whom she left for Torquay, and on Sept. 24 arrived at Chiselhurst. Napoleon joined them in March, 1871, and she continued to reside there after his death.—**Napoléon Eugène Louis Jean Joseph**, prince imperial, son of Napoleon III. and Eugénie, born in the Tuileries, March 16, 1856. He received a careful education, and accompanied his father to Metz on the outbreak of the Franco-German war, and thence to Saarbrück, where, according to Napoleon's despatch to Eugénie, he received his baptism of fire. As the military situation became critical, the emperor provided for the safety of his son by sending him in August to Belgium, and subsequently he joined his mother in England. He is a youth of delicate frame and winning manners, and bears a much greater resemblance to his mother than to his father.

BONAVENTURA, **Saint** (GIOVANNI DI FIDANZA), a cardinal and doctor of the Roman church, born at Bagnarea in Tuscany in 1221, died in Lyons, July 15, 1274. He entered the order of St. Francis in 1248, studied in the university of Paris, was appointed professor of theology there in 1258, and in 1256 elected general of his order. He reconciled the differences among the cardinals on the death of Clement IV., and they chose Gregory X. on his advice in 1271. That pope made him bishop of Albano in 1273 and cardinal in 1274. He died during the session of the second council of Lyons, to which he had been sent as papal legate, and his funeral was attended by the supreme pontiff, accompanied by a brilliant retinue of cardinals

and kings. He was canonized by Sixtus IV. in 1482, and declared by Sixtus V. in 1587 the sixth in rank among the great doctors of the church. The sublime and mystical thoughts which abound in his writings gained him the title of the seraphic doctor. The Franciscans regard him as one of their most learned theologians, and rank him with Thomas Aquinas. He is the patron saint of the city of Lyons, where he was buried. His works include a commentary on the *Magister Sententiarum* of Peter Lombard, the two manuals of dogma called the *Breviloquium* and *Centiloquium*, the *Itinerarium Mentis in Deum*, the *Reductio Artium in Theologiam*, the *Biblia Pauperum*, a life of St. Francis, and various songs and devotional and exegetical treatises. They are of a strong mystical tendency, but fervent in spirit and practical in their teachings. They have been published at Rome (8 vols. fol., 1588-'96), Lyons (7 vols. fol., 1688), and Venice (14 vols. 4to, 1752-'6).

BONCHAMP, Charles Melchior Artes, marquis de, a French soldier, born at Jouvartell, Anjou, about 1760, died near Chollet, Oct. 18, 1793. He served in the American war of independence, and on his return to France resigned and remained faithful to Louis XVI. After the outbreak of the insurrection in Vendée (March, 1793), his tenantry compelled him to place himself at their head. He commanded the insurgent troops in Lower Poitou and in Anjou, and was wounded in the attack on Nantes and on other occasions, and defeated Kléber near Torfou. He was mortally wounded near Chollet, and died next day on the retreat, after having prevented his soldiers from retaliating upon the prisoners of war. The *Mémoires de Mme. de Bonchamp sur la Vendée*, edited by Mme. de Genlis (Paris, 1823), are regarded as good authority, though ultra-royalist.

BOND, in law, an instrument in writing and under seal, whereby one person, who is called the obligor, acknowledges himself bound to another, who is called the obligee, for the payment of a specified sum of money. If this be the whole, it is called a simple bond; but usually the sum mentioned is specified by way of penalty only, and a condition is underwritten which constitutes the real contract, and which may be for the payment of money, or for any other lawful act to be done or performed by the obligor or by any other person, and which when done shall discharge the penalty. To constitute a valid bond, the obligor must be competent to contract, and he must seal and deliver the instrument; he need not sign, though usually this formality is observed. The seal is evidence that it is given upon sufficient consideration. A bond has some advantages over simple contracts, or those which are not under seal, the chief of which is that, under the statutes of limitation, the remedy by suit thereon is not so soon barred; 6 years being in general the period in the case of simple contracts, and 10, 15, or 20, in different states, in the case

of bonds. At common law, also, contracts under seal were entitled to precedence in the distribution of estates of deceased persons. In a suit upon a bond the obligee recovers judgment for the penalty, but to be discharged upon payment of the actual damages sustained by non-performance of the condition, which damages are assessed by the court or jury and constitute the real measure of liability. A bond is not negotiable, and though it may be assigned, the assignee must at common law sue upon it in the name of the obligee.

BOND, a S. W. county of Illinois, intersected by Shoal creek and its branches, and touched on the S. E. corner by Kaskaskia river; area, about 400 sq. m.; pop. in 1870, 18,152. The St. Louis, Vandalia, Terre Haute, and Indianapolis railroad passes through the county. The surface is moderately uneven, and occupied by beautiful prairies and woodland in equal proportion. The soil is fertile. Coal is found near Shoal creek. The chief productions in 1870 were 369,325 bushels of wheat, 1,064,052 of Indian corn, 461,097 of oats, 19,388 tons of hay, and 37,259 lbs. of wool. There were 6,481 horses, 3,618 milch cows, 10,283 sheep, and 16,907 swine. Capital, Greenville.

BOND, Thomas Emerson, an American physician, editor, and preacher, born in Baltimore, Md., in February, 1782, died in New York, March 14, 1856. After studying in the medical school of the university of Pennsylvania, and taking his degree at the university of Maryland, he returned to Baltimore to practise medicine, and was soon called to a professorship there. While practising medicine he was likewise licensed as a local preacher in the Methodist Episcopal church. Trained to a vigorous style by faithful study of the English classics, Dr. Bond was peculiarly fitted to take active part in the theological questions that agitated the Methodist church from 1816 to 1830. In 1830 and 1831 he conducted the "Itinerant," in which he defended the polity of the Methodist Episcopal church against those views of church government that culminated in the secession of the Methodist Protestant church. His reputation is chiefly owing to his editorial management of the "Christian Advocate and Journal," the chief organ of the M. E. church. He conducted this journal for 12 years, being editor-in-chief at his death. He published an "Appeal to the Methodists" (8vo, 1827), and "Narrative and Defence" (8vo, 1828).

BOND. I. William Cranch, an American astronomer, born in Portland, Me., Sept. 9, 1789, died in Cambridge, Mass., Jan. 29, 1859. He was brought up by his father to the trade of watch-making, but devoted much of his time from early youth to studying astronomy. He established a private observatory at Dorchester, Mass., and gained considerable reputation by his discoveries, and in 1838 was selected by the United States government to make observations for the use of an expedition to the South sea. He superintended the construc-

tion of the observatory of Harvard university in 1839, and became its director when completed. From that time he was constantly engaged in astronomical observations and studies, and published the results in the "Annals of the Observatory of Harvard College." He also invented a device for visibly measuring time to a small fraction of a second, and was among the first to use photography as a means of recording the aspects of heavenly bodies. He received the degree of A. M. from Harvard university in 1842, and became a member of the academy of arts and sciences, of the philosophical society, and of the royal astronomical society of London. **II. George Phillips**, son of the preceding, born at Dorchester, Mass., May 20, 1825, died in Cambridge, Feb. 17, 1866. He graduated at Harvard college in 1845, and became an assistant to his father in the observatory, succeeding to its full charge on the latter's death. He wrote several valuable astronomical works, among which are a "Treatise on the Construction of the Rings of Saturn," and the "Elements of the Orbits of Hyperion, and the Satellite of Neptune." The satellite of Neptune and the 8th satellite of Saturn were discovered by himself and his father. He received a gold medal from the royal astronomical society for a work on Donati's comet.

BONDI, Clemente, an Italian poet, born at Mizzano, near Parma, in 1742, died in Vienna in June, 1821. He acquired renown in 1773 by his *Giornata villarecia*, published in Parma, where he was professor of rhetoric. His ode relative to the suppression of the society of Jesus, which event took place shortly after his admission to it, giving offence to influential parties, he fled to Tyrol, and subsequently became a protégé of the Austrian archduke Ferdinand, acting as librarian and tutor. In Vienna he instructed the wife of the emperor Francis in history and literature. His works chiefly consist of celebrated translations of Virgil's *Æneid* and Ovid's *Metamorphoses*, and of lyrical, didactic, satirical, and other poetry, which bears some resemblance to that of Metastasio. A complete edition of his original poetry was published in Vienna in 1808, in 3 vols.

BONDODU, a kingdom of Senegambia in W. Africa, between the Senegal and the upper Gambia. The surface of the country, which is generally flat, save in the southern and central parts, where it rises into hills of moderate height, is covered with vast forests and low stunted bushes. From the hills torrents descend during the rainy season to the Senegal and Falémé rivers. In the vicinity of the towns, where the forests have been cleared away, the soil is found to be light and productive. Cotton, grain, rice, indigo, tobacco, and pepper are cultivated with some industry, while different varieties of fruit are found in great profusion. The climate is warm, but not unhealthy. The population, consisting chiefly of Foola and Mandingos, is estimated at about 1,500,000. The Foola are the dominant tribe. The

people are professedly Mohammedans, but not very strict. In every town there are schools in which the reading and writing of Arabic are taught. The people are of a light copper color,



Bondoo.

and in form and feature resemble the Europeans more nearly than any other tribe of W. Africa, except the Moors. The king possesses absolute power, and has under his command a considerable body of troops. The capital town is Bulbani (pop. about 3,000), situated in an extensive plain at the foot of a range of rocky hills. It is surrounded by a clay wall pierced with loopholes. The houses are small and irregular; the streets narrow, crooked, and dirty. The useful arts are held in high esteem, and a good trade is carried on with some of the Moorish territories. One of the towns, Samcocolo, is famous for its skilful workers in iron and gold.

BONE, the substance which forms the internal skeleton of man and the vertebrated animals, constituting the framework of support, the levers by which force is exerted and locomotion performed, and the boxes or cages in which are enclosed the internal organs. The bony parts of the vertebrated animals are very different in structure and composition from the hard external skeletons of the invertebrata. Bone consists of an organic and an inorganic material, which may be obtained separately by the following simple processes: steep a bone in dilute muriatic or nitric acid; the inorganic or earthy matter is dissolved out, and the organic substance remains, retaining the original size of the bone, and easily bent. In this way is obtained the cartilaginous basis of the bone, on which its shape depends. On the contrary, if a bone be subjected to a strong heat, the organic or animal part is burned out, and the earthy part remains, retaining its form, but

crumbling to pieces at the least touch. To the earthy part, which consists principally of phosphate and carbonate of lime, 51 per cent. of the former and 11 per cent. of the latter, the bone owes its hardness, density, rigidity, and white color; to the animal part, principally cartilage, or some form of gelatine, about 32 per cent., it owes its strength of cohesion. These proportions vary at different ages: in the child, the animal matter forms nearly one half of the bone, accounting for its greater flexibility and the less liability to fracture at this age; in the old, the earthy matter is about 84 per cent., explaining the great brittleness and easy fracture of the bones in aged persons. In the disease called rickets, common among the ill-fed children of the poor in Europe, but somewhat rare in America, there is a deficiency in the deposit of earthy matter, rendering the bones so flexible that they may be bent almost like wax. The power of bone to resist decomposition is remarkable: fossil bones deposited in the ground before the appearance of man upon the earth have been found by Cuvier exhibiting a considerable cartilaginous portion; the jaw of the Cambridge mastodon was found by Dr. C. T. Jackson to contain 42.6 per cent. of animal matter, and cartilage obtained from the same specimen by means of dilute acid was readily converted into gelatine, and made a good glue; a portion of one of the vertebral spines of Dr. J. O. Warren's mastodon was found to contain 30 per cent. of animal matter. The chemical constitution of bone is shown in the following analyses by Berzelius and Marchand:

1. Organic or animal matter.....		33.80	38.26
2. Inorganic or earthy constituents.	Phosphate of lime.....	51.04	52.26
	Carbonate of lime.....	11.80	10.21
	Fluoride of calcium.....	2.00	1.00
	Phosphate of magnesia.....	1.16	1.05
	Soda and chloride of sodium.....	1.20	1.17
	Oxide of iron and manganese, and loss.....		10.5
		100.00	100.00

Some recent authorities deny the existence of fluoride of calcium in bone. Bones are not solid. Make a section of almost any bone, and two kinds of structure are seen: one dense, firm, and compact, on the exterior surface; the other loose, spongy, enclosing cells or spaces communicating freely with each other, in the interior of the bone, and surrounded by the more compact tissue. The loose structure abounds in the ends of bones, securing at the same time greater lightness and sufficient expansion to form the joints, while in the shaft or central portion, where strength is most needed, the compact tissue is more developed. Bones are of different forms, according to the uses to which they are to be applied: some are long, as in the limbs, and these are the principal levers of the body; others are flat and thin, composed of two layers of compact tissue, with an intervening cellular structure, destined to enclose cavities. Bones have also a variety of eminences and depressions, for the

attachment of muscles, the protection of nerves and vessels, &c.; these eminences, or processes, are well marked in proportion to the muscularity of the subject. In females and feeble men the bones are light, thin, and smooth, while in the powerfully muscular frame the bone is dense and heavy, and every prominence is well developed. Exercise is as necessary to the strength of a bone as it is to the strength of a muscle; if a limb be disused from paralysis, or the body be prostrated by long disease, the bones waste as well as the soft parts. The external surface is perforated by numerous minute openings, which transmit the arteries and veins to the interior; this surface is covered by a firm tough membrane, the *periosteum*, composed of densely interwoven white fibrous tissue. The cells, or *cancelli*, of the spongy portions of bone, are made up of thin and inosculating plates of osseous tissue, enclosing spaces between them which are filled with marrow or *medulla*; these are lined with a delicate membrane. On a superficial observation it appears as if the plates of the cancellated structure were arranged without definite plan; but the researches of Prof. Jeffries Wyman and others show that the cancelli of such bones as aid in supporting the weight of the body are arranged either in the direction of that weight, or in such a manner as to support and brace those cancelli which are in that direction. The arrangement of these bony plates in the lumbar vertebrae, the neck of the thigh bone, the tibia, and the ankle and heel, is of itself enough to indicate that man, alone of animals, naturally assumes an erect position. This relation is most evident in the above-mentioned bones, and in the adult, it being less observable in youth and old age. There is no real difference between the compact and the spongy structure of bone, the degree of condensation being the only distinction. The cells of the cancelli communicate freely with each other. In the long bones the marrow is not contained in cells, but in one central medullary canal, lined by a membrane. Both the periosteum and the medullary membrane are abundantly supplied with blood vessels, and are therefore intimately connected with the nutrition of the bone, and their destruction to any great extent leads to the death of the part in contact with them.—Microscopic examination can alone explain the intimate structure of bone. If a thin transverse section of a long bone, as the *femur*, be examined under the microscope, the compact tissue will present several dark circular or oval spots, surrounded by numerous concentric lines; in these lines will be perceived minute black spots, with other lines leading from them in various directions. The larger oval or circular spots are the openings of vascular canals, called "Haversian," from their discoverer, Clopton Havers; these canals are numerous, taking a course parallel to the axis of the bone, joined together by free inosculations of short trans-

verse branches; they thus form a network of tubes for the minute vessels which they convey and protect. According to Todd and Bowman, the arteries and veins usually occupy distinct Haversian canals, a single vessel being distributed to each. The canals conveying the veins are said to be the larger, and to present at irregular intervals, where two or more branches meet, pouch-like sinuses which serve as reservoirs to delay the escape of the blood; in some of the irregular bones, as in those of the skull, the venous canals are extremely tortuous, running chiefly in the cancellated structure, there called *diploë*. The Haversian canals vary in diameter from $\frac{1}{16}$ to $\frac{1}{32}$ of an inch, the average being about $\frac{1}{16}$, and their ordinary distance from each other about $\frac{1}{16}$ of an inch. This whole apparatus of canals is only an involution of the surface of the bone, that the vessels may come into a more free contact with it; as they communicate internally with the medullary cavity, externally with the periosteal surface, and also with the cancellary medullary cells, the network of nutrient vessels is very complete. But, as if this arrangement were not enough to secure the nourishment of such a hard tissue as bone, and so far removed from immediate contact with blood vessels, there is a still more curious and delicate apparatus of microscopic cavities. Around the Haversian canals will be noticed the appearance of delicate *lamellæ* of bone, more or less concentric; these, with the lacunæ mentioned below, are the most essential constituents of true and fully developed bone, the medullary cells and Haversian canals being merely definite spaces existing between the lamellæ. It is principally by the successive development of new lamellæ that bones increase in diameter, being usually deposited in the direction of the axis. A transverse section, therefore, would present under the microscope the following arrangement of lamellæ, as given by Hassall: 1, several layers passing entirely round the bone; 2, others encircling each Haversian canal; and 3, irregular and incomplete lamellæ occupying the angular spaces between those concentrically arranged. The lamellæ of the Haversian canals, however, are not exactly concentric, as commonly described, but incomplete and running into one another at various points, a necessary consequence of the irregular distribution of the lacunæ. The Haversian systems generally run in the direction in which the tissue requires the greatest strength. With the previously mentioned arrangement of the cancellated structure, the Haversian canals more fully display the wonderful adaptation of means to ends, combining mechanical advantages with the best provisions for the nutrition of the tissue. The number of lamellæ passing entirely round the bone is generally less than 12, and those encircling each Haversian canal vary from 2 or 3 to more than 12, the smallest canals having the fewest lamellæ. The lamellæ, according to the best observers, appear to

consist of a delicate network of fibres in sets, the fibres of each set running parallel, but crossing the others obliquely; some have supposed that they are produced by the union of a number of diamond-shaped cells, and not by the crossing of fibres; the first opinion is probably the true one. Distributed through the cancellated and compact portions of bone occur numerous black specks in the lines of the lamellæ; these are the *lacunæ*, or bone corpuscles, the most peculiar and characteristic microscopic form to be found in bony tissue. They differ somewhat in form in different animals, but are always more or less flattened, elongated, ovoid bodies, with numerous branches and radiating filaments passing out from them and communicating with those in the adjacent lamellæ. In the dried bone the lacunæ are empty, owing to the decomposition

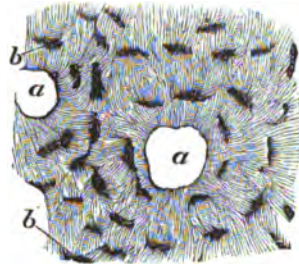


FIG. 1.—Transverse section of bone in the neighborhood of two Haversian canals, *a*, *a*; *b*, lacunæ.

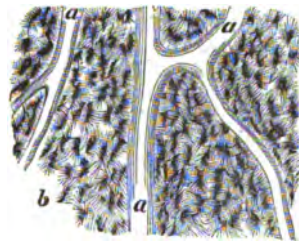


FIG. 2.—Longitudinal section of bone with Haversian canals, *a*, *a*, and lacunæ, *b* (less magnified than the preceding).

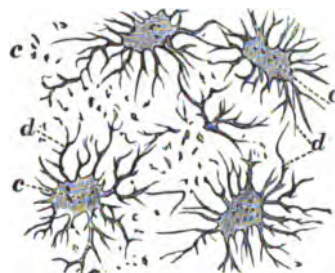


FIG. 3.—Lacunæ, *a*, and canaliculi, *b*, very highly magnified.

and shrinking of the soft parts, and the branched lines running out from them appear as minute canals or *canaliculi*; but in the fresh condition they are both undoubtedly filled with a

soft organized substance, forming an interlacing network of bone corpuscles and filaments, destined to absorb nourishment from the blood vessels occupying the Haversian canals. The bone corpuscles have an average length of $\frac{1}{100}$ of an inch, and they are usually about one half as wide and one eighth as thick. The diameter of the pores, or canaliculi, is from $\frac{1}{200}$ to $\frac{1}{100}$ of an inch.—From the researches of Mr. Tomes and Mr. Quekett it appears that the ultimate structure of bone consists of a congeries of granular particles, deposited in an organized matrix; these granules are often distinctly visible, without any artificial preparation, in the substance of the delicate spicula of the cancelli, varying in size from $\frac{1}{100}$ to $\frac{1}{100}$ of an inch. The *periosteum*, a dense, fibrous membrane, richly supplied with blood vessels, covers the external surface of all bones, with the exception of their articular extremities. The vessels of bone are supplied from the periosteum, and ramify, as has been seen, through the Haversian canals; in the long bones a large artery penetrates by the nutritious foramen into the medullary cavity, sending branches to the medullary cells, and inosculating with the capillaries from other sources. Nerves have not yet been detected in the interior of bones supplying strictly the osseous structure, but the painfulness of many diseases of the bones shows that the external and internal vascular surface must be supplied with nerves. Lymphatics most probably also exist in bone.—At the earliest period of the appearance of a skeleton in the embryo, it consists of a series of cells; these increase in number and density, and are held together by an intercellular substance, thus forming temporary cartilage, which is afterward converted into bone, though not completely so until adult age. Ossification commences at determinate points or centres, the first of which is in the clavicle, and appears during the fourth week; then follow the lower jaw, ribs, femur, humerus, tibia, and upper jaw; the spine and pelvis are late, and the kneecap does not begin to ossify till after birth. There are generally several ossific centres; for instance, in the long bones, one for the shaft, and one for each extremity. The central part of the bone is the *diaphysis*, and is not united till long after birth to the ends or *epiphyses*; processes of bone are called *apophyses*. Ossification generally extends in the intended direction of the chief strength of a bone. According to Todd and Bowman, the process by which cartilage is converted into bone is as follows: The small nucleated cells, with comparatively large and granular nuclei, are uniformly scattered through a homogeneous intercellular substance; at the points of ossification the cells begin to assume a linear series, running down toward the ossifying surface, and separated from one another by the intercellular substance; the cells are closely applied to one another, and so compressed that even their nu-

clei seem often to touch; the lowest rows rest in deep, narrow cups of bone, formed by the ossification of the intercellular substance; the cups are gradually converted into closed *areolæ* of bone, with their lamelliform walls. During this first stage of the process there are no blood vessels directly concerned. The lamellæ of the areolæ, or cancelli, become thicker, and include in their substance elongated oval spaces of a roughly granular nature, in other respects resembling lacunæ, and considered by these observers as the nuclei of the cells of the temporary cartilage; within the cancelli only a few cells are found, these cavities being chiefly occupied by a new granular substance, resembling a formative *blastema*, like that out of which all the tissues are evolved; the cells are in apposition with the wall, and sometimes one seems half ossified, and its nucleus about to become a lacuna; these nuclei have now the same direction as the neighboring lacunæ; from the blastema the vessels are probably developed and the necessary elements for the growth of the bone. The cancelli, at first closed cavities, communicate at a subsequent period, and go to form the Haversian systems, a network of vessels becoming developed within them at the same time. The subsequent process of ossification consists essentially in the slow repetition of the above on the entire vascular surface of the bone. The canaliculi begin as irregularities in the margin of the lacunæ, and are converted as the tissue becomes consolidated into the branching tubes which have been described above, and are accordingly formed in the ossified substance of the cartilage cells. As to the lacunæ, their granular interior seems to be gradually removed, and they become vacuities for the conveyance of the nutrient fluids. Agreeably to this theory of the formation of bone, Todd and Bowman believe that it grows chiefly by layers formed in succession on its vascular surface, but also in an interstitial manner after being originally deposited. A most important process of growth is constantly going on in cartilage by the multiplication of the cells and the increase in their dimensions; in the long bones this growth is most active in the longitudinal direction. Bones also increase by the addition of new systems of laminae on their exterior, and by new involutions of the vascular surface to form new Haversian canals, as has been proved by experiments with madder mixed with the food of animals; the coloring principle of this substance has a remarkable affinity for phosphate of lime, and it affects first the portions of bone in course of formation, or those nearest to the vascular surface. Wherever there is a vascular network in the structure of bone, whether on the periosteal or internal surface, there growth takes place; the exterior increase is strictly analogous to the exogenous mode of growth in plants. A third mode in which bone grows seems to be by the dilatation of the primary cancelli and central Haversian canals; by this enlargement

of the interior the strength of the compact exterior is increased without the disadvantage of an increase of weight.—The reparative power of bone is of the greatest importance in surgery. When a bone is broken, blood is effused, with the coagulum of which a semitransparent lymph is subsequently mingled, covering the surfaces of the wounded parts; in the course of two to three weeks this is gradually condensed by an interstitial change, which converts it into a substance resembling temporary cartilage; ossification takes place in this in a nearly uniform manner, and the whole is transformed in from four to six weeks into a spongy osseous mass which holds the ends of the bone together; this provisional *callus*, as Dupuytren called it, is gradually absorbed during the succeeding months, while the permanent callus is being deposited between the contiguous surfaces of the compact tissue; the permanent callus has all the characters of new bone. When this reparative process is interfered with by meddlesome surgery or constitutional disease, the union takes place merely by ligament, constituting sometimes a false joint.—In reptiles and fishes the cancellated structure usually extends throughout the shaft, which is not so well divided into solid bone and medullary cavity as it is in mammalia. Lacunæ are highly characteristic of true osseous structure, being never deficient in the minutest parts of the bones of the higher vertebrata, though those of fishes are occasionally destitute of them. The lacunæ of birds are longer and narrower than those of mammals, and the canaliculi are remarkably tortuous; in reptiles they are remarkably long and narrow, and in fishes very angular, with few radiations; their size is not in relation to that of the animal, since there is no perceptible difference between their size in the large extinct *iguanodon* and in the smallest living lizard. From the emarginated and festooned outline often seen on sections of bone, Dr. Carpenter, in his "Principles of Human Physiology," expresses the opinion that the older portions of the osseous substance are removed from time to time, and that the irregular outline thus presented by the Haversian spaces is caused by the partial or complete removal of the Haversian system; in their stead newly formed tissue is deposited; this alternate absorption and reproduction takes place at all times of life, though its energy diminishes with the increasing age of the individual.—The complete development of the osseous system characterizes the final stage of the growth of the organism; the vertebral column does not completely ossify in its spinous and transverse processes until the 25th or 30th year; the ossification of the head and the tubercle of the ribs, commencing soon after puberty, is not continued to the body of the bone till some years after; the ossification of some of the cartilages of the sternum is often not completed even in quite advanced age; the bones of the skull are united within a few years after birth. As long ago as Ari-

stotle's time, the duration of the life of animals was measured by their period of growth. Buffon had the same idea, for he says: "The duration of life, to some extent, may be measured by the time of growth." Animals and man grow only until union takes place between the shafts and the ends of the bones; this union occurs in man at the age of 20 years, in the camel at 8, in the horse at 5, in the ox and lion at 4, in the dog at 2, in the cat at 1½, and in the rabbit at 1 year. Recent observations go to show that animals live about five times their period of growth; this would give, according to Flourens, as the age at which man should arrive, if he lived in accordance with the laws of physiology and hygiene, about 100 years; for the camel 40, the horse 25, the ox and the lion 20, the dog 10, the cat about 8, the rabbit 5 years. In an elephant which died at the age of 30 years, the ends of the bones were not united to the shafts, so that it may be confidently asserted that this animal lives more than 150 years.

BONE, Henry, an English enamel painter, born at Truro, in Cornwall, Feb. 6, 1755, died in London in December, 1834. He was brought up to the art of painting on china, and was afterward employed in London in enamel painting on watches, lockets, and other jewelry. His remarkable skill in this work attracted special attention about the year 1800. From that time he devoted himself to painting portraits or copying celebrated pictures on ivory or in enamel. He used larger plates than had been employed for a similar purpose before; his copy of Titian's "Bacchus and Ariadne," which was sold for 2,200 guineas, is 18 inches by 16. Among his other celebrated pictures are "Hope Nursing Love," after Sir Joshua Reynolds, the "Death of Dido," and several collections of historical portraits. A series of 85 portraits of illustrious characters in the reign of Elizabeth occupied his leisure for 25 years, and was finished after his death by his son H. P. Bone. He became a member of the royal academy in 1811.

BONE ASH. Bones, when calcined in open fire, lose all their organic matters and part of the carbonic acid gas they contain, by which their weight is diminished about two thirds. The residue is a dry, friable, and white mass, of the original form of the bones. Pulverized, the powder is grayish white. It consists of basic phosphate of lime, with some lime, fluoride of calcium, carbonate and sulphate of soda, and phosphate of magnesia. The sulphur of the sulphate comes from the cartilage. Prepared from the bones of cattle, the proportion of phosphate of lime is about 90 per cent.; from human bones, about 86 per cent. Other matters may be removed by dissolving in hydrochloric acid, and precipitating by ammonia, when the phosphate of lime and a very small quantity of phosphate of magnesia alone are left in the solution. Bone ash, ground to powder, is made into a paste with gum water, or

beer and water, and moulded into the form of cups, called cupels, which are used in the process of cupellation. This is separating silver or gold from lead, by melting the alloy of the metals in the cupel, and subjecting it to the action of a current of air, which oxidizes the lead, converting it into litharge. This is absorbed by the bone ash as fast as it is produced, till the precious unoxidizable metal is at last left pure and alone in the cupel. The operation is conducted in the same manner on the large scale and in small assays. When carefully prepared, and freed from foreign matters by levigation, bone ash is called burnt hartshorn, and is used for cleaning jewelry.

BONE BLACK, a black carbonaceous powder, obtained by grinding the product of bones burned in a close vessel at a red heat. The name ivory black should properly be limited to the finer and more expensive article prepared from ivory. The volatile products of the distillation of bones are an empyreumatic oil, fetid gases, and ammoniacal vapors. The latter may be collected, as they sometimes are, in forming with them salts of ammonia. The fixed products, which constitute animal charcoal, or bone black, consist of

Carbon.....	9.6
Sulphate of lime.....	0.2
Carbonate of lime.....	8.6
Phosphate of lime.....	78.3
Phosphate of magnesia.....	1.3
Chloride of sodium.....	0.5
Silicate and sand.....	0.3
Protoxide of iron.....	0.5
Alkalies, and sulphur.....	0.5

100.0

The powder resembles that of vegetable charcoal, but is more dense and less combustible, and its ashes are not so readily soluble in sulphuric acid as those of charcoal. The process of preparing the material varies according as the ammoniacal vapors are saved, or allowed to go to waste. In the former case the bones, cleaned of their fatty matters, are carbonized in cast-iron cylinders, which connect by a three-inch pipe with the condensing apparatus. The cylinders are kept at a red heat for 36 hours, when the charred bones are taken out, and the cylinders are refilled. The bones are then ground in mills. The volatile products are in some instances discharged under the fire, by which they are consumed, and their disagreeable odor destroyed. In this way also they afford some heat, and save fuel. By the other process, the bones are put in cast-iron pots, which contain each about 25 lbs., and these are put together in pairs, mouth to mouth, and luted. They are then piled up in an oven or kiln, the entrances to which are tightly bricked up, except those for the admission of the flame from the furnace connected with the kiln, and the opening into the chimney. The pots are well heated for 16 to 18 hours by the flame playing around them, and this is increased by the combustible vapors which issue from the bones. Other arrange-

ments have been contrived for consuming the disagreeable gases.—The valuable property possessed by bone black is its absorbing completely the color of organic solutions, and leaving the liquid clear and limpid; this is greatly facilitated by heating the mixture to the boiling point. Vegetable charcoal possesses the same property also, but to a much less degree. From the year 1800 wood coal continued to be used for decolorizing crude sirups, for which purpose it was about this time recommended by Löwitz, a chemist of St. Petersburg; but in 1811 M. Figuier of Montpellier discovered the greater efficiency of animal charcoal for this purpose, and this being employed the next year by Derosne and Payen, it has since superseded the use of vegetable coal. Although this property of charcoal has been ably investigated by distinguished chemists, as Bussy, Payen, and Derosne, it does not yet clearly appear upon what it is dependent, nor whether it acts mechanically or chemically. M. Bussy has shown that bone black used for decoloring an indigo solution in concentrated sulphuric acid, and this diluted with water, does not give the slightest trace of sulphate of indigo by repeated washings, but does of free sulphuric acid. Treated, however, with an alkaline wash, the charcoal gives up the indigo, thus appearing as if it acted mechanically. The efficiency of the charcoal is greatly dependent upon its being in a minute state of division. The earthy matters combined with the carbon of bones, no doubt, have great influence in effecting this condition. Vegetable coal attains it to some extent, and the decolorizing property also, by being finely comminuted previous to charring; and mixed with pulverized pumice, quartz, or calcined bones, or with some chemically acting ingredient, as carbonate of potassa. The most powerful decolorizer is charcoal obtained in the manufacture of Prussian blue by calcining animal matter with potassa. It is the purest form of charcoal, freed by the potassa from its nitrogen, and reduced by chemical segregation to the finest particles. Carbon obtained by decomposing carbonate of soda also possesses this property in a high degree, from the fine state of division in which its particles are found, so that it would appear to be by no means peculiar to animal charcoal. Even other substances than carbon are observed to possess the same property, as has been shown by E. Filhol, such as sulphur, arsenic, iron reduced by hydrogen, &c. Bone black that has been once used for refining sirups may be revived, so as to answer the same purpose again. The process consists in thoroughly washing out the saccharine matters absorbed, and in some establishments in dissolving the lime, which is also taken up by the bone black, by fermentation in water acidulated with hydrochloric acid. The charcoal is then again calcined in crucibles, or, as in France, in reverberatory furnaces. High steam is said also to restore its property, but this

cannot remove the lime. Several forms of furnace have been contrived in England to effect this purpose; and retorts are used which hold 50 lbs. of charcoal, and in which the re-burning is completed in 15 or 20 minutes.—Besides extracting the color of fluids, animal charcoal takes away the bitter principle from bitter infusions, and iodine also from its solutions; and it is found by Graham that various inorganic substances are abstracted from their solutions, as lime from lime water, and metallic oxides, as lead, from solution in water. Bone black is also used to extract from spirits distilled from grain the volatile poisonous oil, called fusel oil, which gives to the liquors a disagreeable taste. It is also a disinfecting agent.—For chemical and pharmaceutical purposes, bone black requires to be purified, that is, freed from the phosphate and carbonate of lime which constitute its principal part. Dilute hydrochloric acid is used to dissolve these out, and the residue, being well washed, is pure animal carbon. It is used to absorb the active principles of plants from their boiling infusions. The charcoal, after being well washed and dried, is mixed with boiling alcohol, to which it imparts the principle it has absorbed from the vegetable infusion, and an alcoholic extract is obtained. The alcohol then may be distilled off, and the pure substance recovered. Quinia, strychnia, and many other vegetable principles, are thus procured.—The refuse animal black of the sugar refiner is largely used as a manure, and in the manufacture of phosphorus and of baking powders. From the investigations of M. A. de Romanet, it appears that, in old soils exhausted of humus, it produces no effect, having none of this substance to restore to the soil. But it gives out the ammonia it had taken up in the sirups, and neutralizes the bitter and acid principles of healthy or new soils; the phosphates it contains are also rendered soluble in water, and are thus furnished to grains requiring them.

BONE CAVES. In many natural excavations, both in the old and the new world, mostly in the secondary limestone strata, the result of fracture of the earth's crust, of chemical action of acid waters, of erosion by powerful currents, and of slow disintegration by the elements, have been found the bones of extinct post-tertiary mammals, mingled sometimes with the works and bones of man. The most celebrated of these caves in Europe are near Kirkdale, England, 25 m. N. N. E. of York, fully explored by Dr. Buckland; at Bristol; Kent's cave, near Torquay; in the valley of the Dordogne, France, especially those of Moustier and Cro-Magnon, described by Christy and Lartet; and at Gailenreuth in Bavaria. There are many others in Belgium, near Liège; in Sicily, at Gibraltar, in Mexico, in several parts of the United States, and in Brazil. These caves may consist of several chambers at different levels, and show on their walls the erosive action of water, and at the bottom and top various de-

posits of stalagmite and stalactite from the infiltration of lime-bearing waters. Under this lime floor ancient bones have been discovered, mingled, both as to size and species, in the most indiscriminate manner; they are often rolled, as if from the action of floods, sometimes fissured, but often unchanged. The bones most abundantly found are those of the great carnivora of the quaternary period, the bear, hyæna, lion, &c.; with those of the great pachyderms, as the mammoth and the rhinoceros; and of many herbivora and rodents. The English caves were mostly occupied by hyænas, while those of the continent were chiefly caves of bears. At Kirkdale Dr. Buckland found the remains of at least 75 hyænas, of the extinct or cave species, mixed with those of the extinct pachyderms, carnivora, ruminants, and rodents; from which he believed that the hyænas dragged the carcasses there and fed upon them, cracking their bones with the marks of their teeth peculiar to this animal, and leaving behind them their fossil fæces. In Gailenreuth have been found the bones of the cave bear, of at least 800 individuals. Caves containing bones of post-tertiary mammals are rare in North America; but in those of Brazil, explored by Dr. Lund, remains of gigantic rodents, pachyderms, and edentates were found, especially of the extinct megatherioids. The bones found in the caverns have a uniform appearance over large areas of country, and evidently belong to the geological period intermediate between the tertiary and the present epochs. Though some of these caves owe their remains to the fact that they were the dens of hyænas and bears, or were the retreats of sick and wounded animals, there can be no doubt that most of their contents have been brought to the caves by temporary torrents of water independent of marine action; the bones could not have come from a great distance, as they belong to the then existing animals of the region, and are the same as those met with in external transported sediments. Remains of man and of his works have been found mingled with the bones of the above post-tertiary extinct mammals in the caves of Europe, and especially of southern France by Messrs. Christy and Lartet, seeming to place it beyond doubt that man began his existence at this remote epoch. The implements found are invariably those of the early stone age, and the bones never those of the domestic animals afterward subjugated by man.—See *ARCHÆOLOGY*, and the works of Dr. Buckland, Constant-Prévost, Lyell, and the *Reliquiæ Aquitanicæ* of Christy and Lartet.

BONE DUST, bones crushed and ground to dust for manure. The finer the dust the more rapid is its action; the coarser the particles, the longer is their effect slowly given out. This substance is beneficial to the growth of plants from its affording them several of the constituents they require. The following analysis of dry ox bones is by Berzelius:

Phosphate of lime, with a little fluoride of calcium	57.85
Bone gelatine	33.80
Carbonate of lime	3.85
Phosphate of magnesia	2.06
Soda, and a little chloride of sodium	3.45

100.00

The phosphate of lime of the solid bone, and the ammonia furnished by the organic matters connected with it, are particularly beneficial. So valuable is this substance regarded as a manure in England, that in the report of the Doncaster agricultural association it is stated that one wagon load of small drill bone dust is equal to 40 or 50 loads of fold manure. Upon thin and sandy land it is particularly effective, and continues to act for several successive crops. It is best applied when mixed with earth and fermented, and at the rate of 25 bushels of fine bone dust and 40 of broken bones to the acre. It is also used as a top dressing, sown broadcast and by the drill. Pasture and grass lands are greatly benefited by it; white clover springs up wherever it falls; and the turnip crop is largely increased by its application. Bone dust is sometimes adulterated with the raspings and filings of the ivory nut.—In this place the use of dissolved bones and other phosphates, first recommended by Liebig in 1840, may be noticed. The phosphatic materials are first ground to a very fine powder by millstones; the powder is then carried up by means of elevators and discharged continuously into a long iron cylinder, having agitators revolving within it with great velocity. A constant stream of sulphuric acid, sp. gr. 1.66, enters the cylinder at the same end as the dry powder, and the mixture flows out at the other end in the form of thick mud, having taken three to five minutes in passing through the machine. The quantity turned out by such a mixing machine is about 100 tons daily. The semi-fluid mass runs into covered pits 10 to 12 feet deep, each of sufficient size to hold the produce of the day's work. It becomes tolerably solid in a few hours, but retains a high temperature for weeks, and even months, if left undisturbed. The composition of a superphosphate of good quality, made partly from mineral phosphate and partly from ordinary bone, may be stated as follows:

Soluble phosphate	22 to 25 per cent.
Insoluble phosphate	8 to 10 "
Water	16 to 12 "
Sulphate of lime	35 to 45 "
Organic matter	12 to 15 "
Nitrogen	0.75 to 1.5 "

If sufficient sulphuric acid were used to decompose the whole of the phosphate of lime, the product would be too wet to be packed in bags, and would require either to be mixed with extraneous substances of a dry and porous nature or to be artificially dried. The manufacture of manures from guano, from the Ashley river deposits of South Carolina (see COPROLITES), and from the mineral apatite, has become an industry of great importance. The commercial superphosphates are so frequently

adulterated that purchasers would do well to have the samples analyzed before contracting for large quantities.

BONESET, or *Thoroughwort*, the herb *eupatorium perfoliatum*, an indigenous perennial plant growing in moist places, distinguished by the perfoliate character of its leaves, each pair of which are at right angles to those immediately above and below. It is a bitter weed or vegetable tonic, with a faint odor and a strong bitter taste. Hot water extracts its virtues, which are believed to reside chiefly in a bitter principle. The cold infusion acts as a mild, pleasant tonic; the hot infusion as a diaphoretic, and, when very strong, as an emetic. Strong infusions of boneset leaves are used as a substitute for Peruvian bark in cases of ague, and sometimes with success; but it is not always to be relied on. A pint of boiling water is poured upon an ounce of the dried leaves, or



Boneset.

a pint of cold water upon an ounce of the fresh leaves, and allowed to stand two hours; it is then strained for use. A weak cold infusion is good for all cases of debility where tonics are prescribed. For ague as much should be taken as the stomach will bear, and it should be drunk warm.

BONET, Juan Pablo, a Spanish instructor of the deaf and dumb, held by some authors to have been the inventor of their first alphabet and means of communication, born in Aragon in the latter part of the 16th century. He was attached to the secret service of Philip III., but the greater part of his time was occupied by his efforts in behalf of the class in which he had become interested early in life. His system is explained in his work on the subject, *Reduccion de las letras y artes para enseñar á hablar á los mudos* (Madrid, 1620). His claim to the actual invention of the first means of communication for the deaf and dumb is rejected by the majority of writers, who give the credit to a Spanish Benedictine monk, Pedro Ponce, who lived some 50 years before Bonet. Ponce wrote nothing of the art, however, and

the honor of first diffusing this important knowledge seems to belong entirely to the latter teacher.

BONHEUR. I. Rosalie (commonly called Rosa), a French painter, born at Bordeaux, March 22, 1822. Her first instructor in painting was her father, Raymond Bonheur, an artist of considerable merit; but she owes her remarkable success in the delineation of animals to a constant study of living subjects. Her first contribution to the French exhibition was made in 1841, when she sent two pictures, "Goats and Sheep" and "Two Rabbits." From that time she devoted herself to her favorite class of subjects, visiting stables, shambles, and fairs, and studying the structure and habits of animals under all circumstances. The result of these studies was a series of pictures which gave her a reputation second to that of no artist in her special department. Among the most noted of her paintings are "The Horse for Sale," "Horses in a Meadow," "The Three Musketeers," "A Dove on the Road," "Farm Labor in Nivernais," "Cows and Sheep in a Hollow Road," "The Horse Fair," "Deer Crossing an Open Space," and "Bucks in Repose." The "Ploughing in Nivernais" was placed in the Luxembourg, and the "Horse Fair" was a leading attraction at the French exposition of 1853 and at the universal exposition at London in 1855. The artist worked 18 months on this latter picture, attending the horse market in Paris regularly twice a week during the time. Mlle. Bonheur became directress of the free school of design for girls at Paris in 1849, but has given little of her own time to its affairs, her sister Mme. Peyrol having actual charge of the institution. She has tried her hand at sculpture as well as painting, and in 1848 took a first class medal for a bronze group. She has received several other medals and prizes, and in 1865 was decorated with the cross of the legion of honor. Her latest picture (1872) represents a fight between a hyæna and a tiger. **II. Auguste**, a French artist, brother of the preceding, born in Bordeaux, Nov. 4, 1824. He studied under his father, and has painted landscape, genre, and cattle pieces, making rather a specialty of the last named department, besides a few portraits. He has received a medal of the first class. **III. Jules Isidore**, a French sculptor, brother of the preceding, born in Bordeaux, May 15, 1827. He studied painting under his father, and at the same time gave much attention to modelling in clay, choosing animals generally for his subjects. His first works publicly exhibited were a painting representing a combat between a lioness and a horseman, and a sculptured group illustrating the same subject. He soon after abandoned painting, and has since devoted himself exclusively to the production of single figures and groups, mostly in bronze, representing cattle, horses, dogs, and animals of the chase. **IV. Juliette** (Madame Peyrol), a French painter, sister of the pre-

ceding, born in Paris, July 19, 1830. She has painted chiefly animals and rural subjects, and is her sister's chief assistant in the direction of the school of design for women at Paris.

BONHOMME, a S. E. county of Dakota, separated from Nebraska on the south by the Missouri river; area, about 400 sq. m.; pop. in 1870, 608. The productions in 1870 were 1,980 bushels of wheat, 3,520 of Indian corn, 1,590 of oats, 2,870 of potatoes, and 1,815 tons of hay.

BONI, one of the principal states of the Bughis nation in the S. W. peninsula of Celebes, bounded E. by the gulf of Boni and W. by Macassar; area, 2,850 sq. m.; pop. 180,000. The country is mountainous, Lompo-Batang (great pillar), 8,200 ft. high, being the loftiest peak on the island. Lake Labaya, in the N. W. corner of the territory, is a beautiful sheet of water, 24 m. long by 13 broad, and receives numerous small streams. The valleys and plains are fertile, and inhabited by a thrifty and industrious people. They carry on considerable traffic in gold dust, tortoise shell, pearl, camphor, nutmegs, and various drugs, and obtain European products from Batavia and Singapore. The country is tributary to the Netherlands, but is governed by a king who is chosen for life by the chiefs of the eight petty states of which it is composed, and who can decide upon no important measure without their consent. The capital is the inconsiderable town of Boni, on the shores of the gulf, in lat. 4° 22' S., lon. 120° 18' E.

BONIFACE, the name of nine popes of the Roman Catholic church. **I. Saint**, the successor of Pope Zosimus in 418, died in 422. The emperor Honorius supported his claims to the pontifical chair against the archdeacon Eulalius, who was chosen by an opposition party supported by Symmachus. St. Augustine dedicated to this pontiff his four books against the Pelagians. **II. Successor of Felix IV. in 530, died in 532.** His election was disputed, but Dioscorus, the rival claimant, died, and the schism ended. **III. A Greek, successor of Sabinianus in March, 607, died in November of the same year.** He convoked a council of 72 bishops, in which certain laws were passed against choosing successors to popes or bishops during their lifetime, and obtained from the emperor Phocas the acknowledgment that the see of Rome had universal supremacy. **IV. Saint**, son of a physician, successor of Boniface III., died probably in 615. He changed the Pantheon with the permission of the Byzantine emperor into a church, and his own house in the country of the Marsi into a monastery. **V. A Neapolitan, successor of Pope Deusdedit in 619, died in 624 or 625.** He forbade civil judges to take away from the churches by force those who claimed there the right of asylum. **VI. Pope after Formosus in 896, occupied the throne only 15 days.** Having been uncanonically elected by a popular faction, he is sometimes regarded as one of the antipopes. **VII. France**, a cardinal deacon,

chosen in a popular tumult in which Benedict VI. was strangled in 974, died in 985. He was expelled from Rome shortly after his election, and went to Constantinople, but returned on the death of Benedict VII. (983), and finding John XIV. in the papal chair, had him thrown into prison and resumed the place. **VIII. Benedetto Gaetano**, born at Anagni about 1228, died in Rome in October, 1303. About 1255 he visited England; in 1280 he went to Germany as secretary of a papal legate; in 1281 he was made a cardinal by Martin IV., who allowed him to receive the revenues of twelve benefices, seven of them being in France and one in England. He was papal legate in France in 1290, and afterward in Sicily and Portugal, and was chosen to the papal chair on the abdication of Celestine V. in December, 1294. His entry into Rome was attended with extraordinary pomp. In 1296 Boniface issued his famous bull, *Clericis laicos*, by which he forbade the clergy, under pain of excommunication, to pay without the consent of the holy see any subsidy or tax on any ecclesiastical property, and extended the excommunication to the emperors, kings, or princes who should impose such subsidy. The vigor with which Philip the Fair resisted this bull obliged the pope to retract, and to allow the taxes to be raised in France as before. He became soon after embroiled with the Colonna family, who denied the validity of his election. Two cardinals of this family were deprived of their dignities; the entire family were excommunicated, their descendants were condemned to civil degradation to the fourth generation, their castles and their city, Præneste, were totally destroyed, and Frederick of Aragon, whom they had supported, was ordered to renounce the title of king of Sicily, and to evacuate the island. The Colonnas took refuge in France. Boniface interfered to make peace between France and England. He censured the king of Denmark and his brother; forbade the king of Naples to treat with Frederick, elected king of Sicily; summoned to Rome Albert I., king of Germany, whose election as emperor he declared to be invalid without the papal sanction; and rebuked Philip the Fair for his treatment of Guido of Flanders. In 1300 Boniface proclaimed the first jubilee in a bull granting plenary indulgence to all who should visit the sanctuaries in Rome during that year. Soon after this his quarrel with the king of France became more violent than ever. In December, 1301, Boniface issued the bull *Ausculta Dei*, and convoked a council of the French bishops at Rome to examine the conduct of King Philip, at the same time affirming it to be heretical not to believe that the king was subject to the pope in secular as well as spiritual affairs. The French nation, however, opposed the pretensions of the pope, and supported their king; and it was formally declared by the three estates that the king held his power in fief to no one, and in secular matters was

subject to God alone. The bishops were forbidden to attend the council at Rome, which therefore was never held. In 1302 the bull *Unam sanctam* affirmed the claims of the pope, setting forth that the church wields two swords, the spiritual and the secular, but that the secular is subordinate to the spiritual, and that therefore kings, who hold the former, are subject to the pope, who holds the latter. The bishops of France were again convoked under pain of excommunication; but Philip ordered the sequestration of the property of every one who should be absent from his diocese, and in his turn summoned a general council at Lyons to judge the pope. To this council the university of Paris and a large number of prelates adhered; the excommunication of Philip followed, April 13, 1303; and in June the assembled estates of France declared the pope a criminal and a heretic. The king sent Guillaume de Nogaret and Sciarra Colonna to Rome to seize the pope and bring him before the council of Lyons. They armed about 800 malcontent Italian nobles, surprised Anagni, the residence of Boniface, forced the palace, and seized the person, diamonds, and papers of the pope, and guarded him as a prisoner. After three days Boniface was rescued by the inhabitants of Anagni and taken to Rome, where he was protected in the Vatican by the Orsini; but the violent commotion he had gone through caused his death 84 days after his captivity. Boniface incurred the bitter enmity of Dante by his persecution of the Ghibellines, and is repeatedly denounced in the *Divina Commedia*. **IX. Pietro Tomacelli**, born in Naples, succeeded Urban VI., at Rome, Nov. 2, 1389, while the antipope Clement VII. ruled at Avignon, died in Rome, Oct. 1, 1404. He recognized Ladislas, the son of Charles of Durazzo, as king of Naples in 1390, and celebrated two jubilees, 1390 and 1400. The annates, which had before been occasional, he made perpetual, and decreed that archbishops and bishops nominated to benefices should pay to Rome one half of their first year's revenue. He was twice expelled from Rome by the municipal authorities, and when in 1400 his presence became necessary for the celebration of the jubilee, he refused to return till the Romans consented to the overthrow of the municipal government, promised obedience to a senate appointed by himself, and paid him a sum of money. From that time he ruled the city absolutely.

BONIFACE, a saint of the Roman Catholic church, born in Devonshire, England, about 680, died in Friesland in June, 755. His baptismal name was Winifrid or Winifreth. He is usually called the apostle of Germany, though he was not the first to preach Christianity in that country. He was educated in the Benedictine monastery of Exeter, and was at one time professor of theology, history, and rhetoric in that of Nutcell, where he became a presbyter. In 718 he went to Rome, and received from

Pope Gregory II. an apostolic mission to Germany. He entered Friesland, where he preached during three years, then passed into Hesse, and founded there a monastery, around which in the course of time grew up the city of Marburg, and which now remains as a university. In 723 Gregory II. called him to Rome and consecrated him as a bishop, and on this occasion his name of Winifrid was changed to Boniface. In 732 Gregory III. made him archbishop and primate of Germany, and in 738, after a third journey to Rome, papal legate. He erected various bishoprics, and established numerous churches in different parts of the country. He also exercised a great influence over the last Merovingians, and over Pepin and Carloman. He was named archbishop of Mentz by Pepin, and founded the celebrated abbey of Fulda, and also those of Fritzlar and Hammelburg. Boniface finally gave up his see of Mentz, in order the better to preach to the Frisians. In one of his journeys across the savage country where now is Dokkum, near Leeuwarden, he was attacked by the natives and slain, together with some 50 of his converted companions, whom he forbade to use any means of defence. His body was buried in Utrecht, afterward removed to Mentz, and finally to Fulda, where a copy of the Gospels in his handwriting is still preserved. A complete edition of his letters was published at Mentz in 1789. His other writings (*De Rebus Ecclesiasticis*, *Instituta Synodalia*, and *De suis in Germania Rebus*) were published at Oxford in 1845, in 2 vols. A monument to him was erected in 1811 on the spot (near Altenberga, Thuringia) where the first Christian church was built by him in 724. Another was erected at Fulda in 1842.

BONIFACIO, Strait of (It. *Bocca di Bonifacio*), the passage between Corsica and Sardinia, about 7 m. wide in the narrowest part. The land is mountainous and the shores steep on either hand. Several small islands lie at the eastern entrance. The strait is difficult of navigation. The town of Bonifacio, an ancient seaport on the southern extremity of Corsica (pop. about 3,000), has important coral fisheries. A submarine telegraph connects it with Longo Sardo on the opposite Sardinian coast.

BONIN. I. **Eduard Wilhelm Ludwig von**, a Prussian general, born at Stolpe, March 3, 1793, died in Coblenz, March 13, 1865. He was the son of a general, and enlisted in his 18th year; captured by the French at the taking of Lübeck, Nov. 6, 1806, he was immediately released on account of his youth. He was rewarded with the iron cross for his gallantry at the battle of Lützen, gradually rose in rank from 1817 to 1848, when he became brigadier general, and acquired celebrity in the first Schleswig-Holstein war. In 1849 he was commander-in-chief of the federal as well as of the Schleswig-Holstein troops. He relinquished these commands in 1850, was Prussian minister of war in 1852-'4, and again in 1858-'9, and

spent the rest of his life in Coblenz as commanding general of the eighth army corps. II. **Adolf von**, a Prussian soldier, born Nov. 11, 1808, died in Berlin, April 16, 1872. He entered the army in 1821, became in 1858 adjutant general of the king, which post he retained till 1863, when he rose to the command of the first army corps, and in 1864 to the rank of general of infantry. He distinguished himself at the battle of Sadowa, July 3, 1866, and subsequently acted as commander of the Prussian forces in Saxony, and as governor of Dresden till May 28, 1867. In August, 1870, he was appointed governor general of Lorraine, where he displayed tact and moderation. In March, 1871, he resumed his position on the royal staff.

BONIN ISLANDS, a group of 70 islands and 19 rocks in the north Pacific, composed of three small clusters, between lat. 26° 30' and 27° 44' N. and lon. 142° and 145° E. The northern cluster was named by Capt. Beechey Parry's group, and the southern, Bailly's group, while



Chasm near Port Lloyd.

to the islands of the middle cluster he gave the separate names of Peel, Buckland, and Stapleton. Peel island (the only one inhabited) has long been visited by whalers for supplies. From 1675 to 1725 the Bonin islands were used by the Japanese as penal colonies. In 1826 the first settlement was made by two English sailors, and in the same year Capt. Beechey arrived to take possession of the islands for the British crown. By the treaty of 1854, Port Lloyd on Peel island was opened to American and British shipping. The Bonin islands are volcanic; the water around them is very deep, and the shores are precipitous and abound in singular chasms, one of the most remarkable of which is through a headland near Port Lloyd. Timber is scarce. The few inhabitants, chiefly natives of the Sandwich islands, adopted a constitution, Aug. 28, 1853, and are ruled by a magistrate who is elected for two years.

BONINGTON, **Richard Parkes**, an English painter, born at Arnold, near Nottingham, Oct. 25, 1801, died in London, Sept. 23, 1828. He was the son of an artist, and was educated in Paris. Having achieved some reputation there he went to Venice, where he made many sketches, and

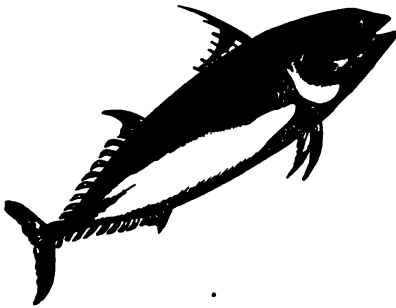
in 1828 returned to England. He painted chiefly in water colors, reviving the taste for them in France, after they had been neglected for 20 years. His best productions are marine views and representations of coast scenery.

BONITO, a name given to several scomberoid fishes of the genera *thynnus*, *auxis*, and *pelamys*. The bonito of the tropics, so celebrated for its pursuit of the flying fish, is the *thynnus pelamys* (Linn.). Its range is exten-



Bonito (*Thynnus pelamys*).

sive in the tropical Atlantic, and it probably extends to the Pacific and Indian oceans. It has the graceful form, habits, and activity of the common tunny, but it is much smaller, rarely attaining a greater length than 2½ ft.; the color of the back and sides is of a brilliant steel blue, with green and pink reflections; the belly is silvery, with eight brown longitudinal bands, four on each side, extending from the throat to the tail. Its food is principally small fish, the higher mollusks, and sometimes marine plants; it is readily taken by the hook, and its flesh,



Plain Bonito (*Auxis vulgaris*).

though dry and occasionally injurious, is considered by mariners as a luxury. The *T. coretta* (Cuv.) is also called bonito in the West Indies. The bonito of the Mediterranean is the *auxis vulgaris* (Cuv.), resembling the mackerel in the separation of the dorsal fins; the color of the back is blue, with irregular lines and spots of a blackish blue on the sides; the average length is 15 inches, and the weight rarely exceeds 6 lbs. The bonito of the New England

fishermen is the *pelamys sarda* (Bloch), called also skipjack; its genus differs from the tunny only in having separate, pointed, and strong teeth; the color of the head and upper parts is a greenish brown, the sides lighter, and the belly silvery white; 10 or 12 dark-colored bands pass obliquely downward and forward from the back toward the sides, sometimes as low as the abdomen; the lateral line is rather undulating; it is rarely more than 2 ft. long. It is found in the Mediterranean, and in the temperate regions of the Atlantic, from the Cape Verd islands to the American coast; it is considered good eating in the Mediterranean. The *P. Chiliensis* (Cuv.) of the Pacific coast of South America is also called bonito. This term is Spanish, meaning "pretty," and is doubtless applied to many other species of fish.

BONJOUR, two brothers, natives of Pont d'Ain, in France, who founded a new sect somewhat similar to the Flagellants of the 13th century. They were educated for the church, and the elder held at first a curacy in La Forez. In 1775, being censured by his bishop for heresy, he was removed from this parish and appointed to that of Fareins, of which his brother was made vicar. After living an irreproachable life for eight years, the elder brother resigned the curacy to the younger, alleging himself to be unworthy of the office. He soon acquired a reputation for working miracles, and attached to himself a number of followers, mostly women and young girls, who called him their *petit papa*. They held to community of goods, and indulged in eccentric practices which excited a very strong popular sentiment against them. One of the devotees, a young girl, was said to have been publicly crucified by Bonjour in the church, without sustaining any injury. One of their most prominent opponents being found dead in his bed, by the prick of a needle, the elder Bonjour was exiled, and his brother imprisoned in the convent of Toulay, from which he escaped, as he alleged, by the intervention of an angel. The revolution of 1789 encouraged the former to return to Fareins, and in the absence of the curé and vicar he took possession of his church, and issued orders to his followers, who rallied around him. He was, however, soon dislodged from his occupancy, and under the consulate exiled to Lausanne with his brother, where they both died in extreme poverty. Their sect, known as the *flagellants fareinistes*, perished with them.

BONN, a city of Rhenish Prussia, on the left bank of the Rhine, 15 m. S. S. E. of Cologne; pop. in 1871, 26,020, of whom about 4,300 were Protestants, 500 Jews, and the rest Roman Catholics. It is finely situated on an eminence in a fertile region, 10 m. N. N. W. of the peak of Drachenfels. It has seven gates, and with its many gardens presents a cheerful appearance. The finest public square, Münsterplatz, adjoining the cathedral, is planted with trees, and has a monument of Beethoven, who was born at Bonn. The bust of Arndt was

BONN

BONNER


placed in 1865 on the beautiful promenade of the Alte Zoll, and his house and garden have been presented to the town for conversion into a turners' hall. Bunsen died here in 1860. The monument of Niebuhr, by Rauch, is in the cemetery outside the Sternen gate. A. W. von Schlegel and Schumann were also buried here. The cathedral or minster, surmounted by five towers, contains a bronze statue of St. Helena, the mother of Constantine the Great, and supposed founder of the church. The central tower, the windows of the nave, and the cloisters are its most remarkable parts. The church of St. Remigius contains a picture by Spielberg of the baptism of Clovis. A Protestant church has been established since 1864. The town hall, on the market place, is a handsome modern building ; but the most renowned public edifice is the university, the chief source of the celebrity and prosperity of Bonn, and the most elegant and extensive academical building of Germany. It was formerly an electoral pal-

provided by him with the present. There are five faculties, namely, of law and Roman Catholic theology, medicine, jurisprudence, and philosophy; the total number of professors and adjuncts is about 90 professors and adjuncts. The number of students is nearly 900. Albert and his son Prince Alfred study here, and among the professors have been the most learned men of Germany.—The city occupies the site of the ancient Bononia of the Ubii, afterward a Roman stronghold in Germania Secunda. A. D. 46, A. D. Tacitus, Civilis here defeated the Romans under Gallus. Bonn is said to have received Christianity in the year 88. It was destroyed in 355 by German tribes, and rebuilt by Julian; and it was again almost destroyed by the Northmen in 881. The archbishop of Cologne surrounded the town with a wall in 1240, and conferred many privileges on the citizens, and the emperor Charles IV. was here in 1356. The French took it in 1794.



University of Bonn.

ace, and contains a hall decorated with frescoes, lecture rooms, a library with over 200,000 volumes, a museum of Rhenish antiquities, a cabinet of natural history, and an archæological museum. There are separate buildings for the anatomical theatre and chemical laboratory. The villa of Poppelsdorf, formerly an electoral château, a mile from the town, belongs to the university, and contains apartments for the officers and professors, lecture rooms, galleries of painting, and a collection of natural history. Here are situated the botanical gardens, an agricultural institute with an area of over 100 acres, and a manufactory of earthenware and pottery. On the fine road to Poppelsdorf is the observatory. The university was founded in 1786 by the archbishop Maximilian Frederick. In 1802 it was converted by the French into a lyceum, but restored upon a much larger scale in 1818 by Frederick William III., and



surrendered prince of O Montecuculi same year, possession in lost it in 16 it was bomb captured by III., elector denburg. It was taken by after three d bardment, ar the fortificat razed in 171' under Frencl tion from 180 when it was of Prussia.

BONNER, F
English bish
at Hanley, V
shire, about
in the Marsh

on, London, Sept. 5, 1569. His repu was a sawyer, but some affirm th the illegitimate son of a priest. he entered Pembroke college, Oxfo in 1519 he took the degrees of ba the canon and civil laws, and was r dained. By 1525 he had attaine gree of doctor, and was appointed cl Wolsey. After the fall of Wolsey he favorite of Henry VIII., and receive livings. Much of his promotion w the favor of Thomas Cromwell, in schemes for religious reformation h entered. In 1532 he was sent as Rome, and the next year to Marsell pope Clement VII. then was, to a general council from the papal decr communication against Henry VII count of his divorce from Catharine c In 1538, while on an embassy to Par

named bishop of Hereford, but before his consecration was translated to the see of London; his commission from the king was dated in 1540. In 1547 he was sent as ambassador to the emperor Charles V. After the death of Henry, Bonner broke with the reformers, and, protesting against the measures of Cranmer, hesitated to take the oath of supremacy; for this he was committed to the Fleet, but making submission was soon released. His continued hostility to the reformation drew upon him the displeasure of the privy council, before whom he was arraigned on charge of failing to fully comply with an order directing him to preach a sermon on the contested four points. For this, in October, 1549, he was deprived of his bishopric, and committed to the Marshalsea prison. Upon the accession of Queen Mary, in 1558, he was restored to his see, and became a prominent upholder of the persecutions which followed. He was appointed to perform the act of degradation upon Cranmer, against whom he had an old grudge, and executed this function with extreme insolence. The names of 125 persons are given who were executed for heresy in his diocese, and through his agency; and 22 more whom he had condemned were saved only through the influence of Cardinal Pole. When Elizabeth ascended the throne in 1558, she manifested a strong repugnance to Bonner, but left him in possession of his see until the next year, when, upon his refusing to take the oath of supremacy, he was deposed, and again committed to the Marshalsea prison, where he remained until his death. Even after ten years' confinement public feeling was still so bitter against him that he was buried at midnight for fear of a tumult.

BONNER, Robert, an American journalist, born near Londonderry, Ireland, April 28, 1824. In 1839 he came to Hartford, Conn., where his uncle was a prosperous farmer, and entered the printing office of the Hartford "Courant" as an apprentice. Here he became a thorough printer, and laid the foundation of his subsequent fortune by extra work and rigid economy. He removed to New York in 1844, was employed upon the "Evening Mirror," and acted as correspondent of the Hartford "Courant," and of newspapers in Boston, Albany, and Washington. In 1851 he founded the "New York Ledger," by purchasing the business and establishment of the "Merchant's Ledger," a weekly commercial newspaper, which he transformed into a journal of current literature and popular fiction. His enterprise in the conduct of this paper, and especially his practice of advertising to an unprecedented extent, has given it an immense circulation, at times reaching 400,000 copies. Mr. Bonner is well known as the owner of the finest stable of trotting horses in the United States, which he never allows to take part in public races.

BONNET, Charles, a Swiss naturalist and philosopher, born in Geneva, March 18, 1720, died there, May 20, 1798. He was educated for the

law, but reading Pluche's account of the *formica leo*, he undertook to find this insect for himself. This search interested him in many other insects. He read other works, and made further observations, discovering several undescribed species, and becoming a naturalist of rare attainments at the age of 16. At 18 he communicated to Réaumur several interesting facts, and at 20 his discovery that several generations of aphides are produced by a viviparous succession of females without the males, for which he was elected a corresponding member of the French academy of sciences. Learning of Trambly's experiments on the reproduction of certain polyyps by bisection, Bonnet experimented, and discovered that certain so-called worms could be multiplied by the same process. He published these discoveries in his *Traité d'insectologie* (1745). In 1754 he published *De l'usage des feuilles*, treating upon vegetable physiology, and in 1762-'8 *Considérations sur les corps organisés*, embodying his views on the origin and reproduction of organic forms of life. The failure of his sight drove him from the field of actual observation to that of speculative philosophy. His *Essai de psychologie* appeared in 1754, and his *Essai analytique des facultés de l'âme* in 1760. In his *Contemplation de la nature* (1764-'5) he tried to construct a chain of nature from the lowest organism up to the Deity. His *Palingénésie philosophique* (1770) puts forth the idea that the souls of animals are immortal and rise progressively in the scale of being. He published in 1771 *Recherches philosophiques sur les preuves du Christianisme*, a defence of revelation. His complete works were published at Neuchâtel, before his death, in 8 vols. 4to, and with illustrations, in 18 vols. 12mo.

BONNEVAL, Claude Alexandre, count de, a French soldier, born at Coussac, in Limousin, July 14, 1675, died in March, 1747. Being found unmanageable at the Jesuit college, he left it to enter the navy at the age of 12 years. He left this service in 1698 on account of a duel with the lieutenant of his vessel, and bought a commission in the guards, and afterward in a regiment of infantry. He served with Vendôme in Italy, where he displayed great courage and skill. Getting into trouble with the accounting officers and the minister of war, he wrote the latter an insulting letter and threw up his commission as colonel. After spending some time in Italy, he entered the service of Austria as a major general, and fought under Prince Eugene in several campaigns in Italy, France, and the Netherlands. While the negotiation of the treaty of Utrecht was in progress he fought a duel with a Frenchman for denying that Louis XIV. aspired to universal monarchy, and another with a Prussian for maintaining the same thing. He afterward fought against the Turks, and was severely wounded at the battle of Peterwardein. Having gone to Paris in 1717 to sue for a pardon, he was induced by his mother to marry a

daughter of Marshal de Biron, but deserted her ten days after and returned to the army of Prince Eugene, distinguishing himself at Belgrade and obtaining an important command in Sardinia and Sicily (1719). Being concerned in a lampoon on the associates of Eugene, he was sent to his regiment at Brussels, where he soon got into trouble with the governor of the Netherlands and was sent to the citadel of Antwerp. He made the matter worse by writing a letter to Prince Eugene which was construed as a challenge, and after trial he was sent beyond the border on condition that he should never set his foot on German soil again. He went first to Venice and then to Bosnia, where he was arrested and held in custody 15 months. Fearing that he would be delivered up to the Austrian authorities, he turned Mussulman, was made a pasha under the name of Ahmed, and undertook to reorganize the Turkish army. His propensity for getting into trouble still attended him, and in 1788 he was exiled to Asia. He finally appealed to his friends to secure his safe return to France. The pope offered him an asylum at Rome, and the king of the Two Sicilies a pension. A galley was sent to assist him to escape, but he died before he could effect his purpose. Various memoirs and collections of anecdotes concerning his adventures were popular in the last century.

BONNEVILLE, Benjamin L. E., an American soldier, born in France about 1795. He graduated at West Point in 1815, and in 1820 was employed in the construction of a military road through the state of Mississippi, and afterward on frontier duty till 1825. In 1831, receiving a furlough, he set out upon an exploring expedition beyond the Rocky mountains, and not being heard of till 1836, his name was dropped from the army list. His journal, edited and amplified by Washington Irving, was published in 1843, under the title of "Adventures of Captain Bonneville, U. S. A., in the Rocky Mountains and the Far West." Restored to the army, he served in the Indian territory and in the Florida and Mexican wars, becoming major in 1845 and brevet lieutenant colonel in 1847. He became colonel in 1855, was assigned to the command of the department of New Mexico, and in 1857 commanded the Gila expedition. In 1861 he was retired from active service for disability, and during the civil war served as superintendent of the recruiting service and chief disbursing officer in Missouri. In 1865 he was made brevet brigadier general.

BONNIVARD, François de, a writer and politician of Geneva, born in France in 1496, died about 1571. Coming into possession of a rich priory near Geneva, he heartily espoused the cause of that republic against the designs of the duke of Savoy, and in 1530 was arrested by the agents of Savoy and imprisoned in the dungeons of the castle of Chillon. He was restored to liberty six years later, when Chillon fell into the hands of his countrymen. He was employed from 1546 to 1552 in writing the

chronicles of Geneva, from the time of the Romans to 1580. He was versed in Latin literature, theology, and history, and left several works, which have remained in manuscript. He left a large collection of books to Geneva, from which has grown the public library of that city. The imprisonment of Bonnivard in the castle of Chillon forms the foundation of Byron's poem "The Prisoner of Chillon."

BONNY RIVER, one of the outlets of the Niger, at its delta on the coast of Guinea. Near its mouth is Bonnytown, which was once a place of great resort for slavers. Large quantities of palm oil are exported from this place. The country around the river is flat and swampy. The people are dirty and superstitious, and large numbers of them die every year from dysentery and fever, owing to the unhealthy climate.

BONNYCASTLE. I. John, an English mathematician, born at White Church, Buckinghamshire, died at Woolwich, May 15, 1821. He was for more than 40 years one of the mathematical masters at the royal military academy at Woolwich, and published introductions to arithmetic, algebra, astronomy, geometry, and trigonometry, an edition of Euclid's "Elements," and a general history of mathematics from the French of Bossut. **II. Charles**, son of the preceding, born at Woolwich in 1792, died at Charlottesville, Va., in October, 1840. He assisted his father in preparing his mathematical text books, wrote various articles for cyclopædias, and when the university of Virginia was founded was selected to occupy its chair of natural philosophy. He arrived in this country in 1825, was transferred to the professorship of mathematics in 1827, and was the author of a treatise on "Inductive Geometry" and of several memoirs on scientific subjects.

BONOMI. I. Giuseppe, an Italian architect, born in Rome in 1739, died in London, March 9, 1808. He went in 1767 to London, where he was employed as a draftsman. In 1775 he married Rosa Florini, the cousin of his friend Angelica Kauffmann, and, excepting one year spent with the latter in Italy (1788-'4), he remained for the rest of his life in London, and in 1789 he was elected associate member of the royal academy. He was the architect of the chapel of the Spanish embassy, of Eastwell house, Kent, of the pyramidal mausoleum in Blickling park, Norfolk, and of other famous structures; but his masterpiece was the duke of Argyll's country seat, Roseneath, Dumbartonshire, which he did not live to finish. **II. Joseph**, an English archæologist and author, son of the preceding, born in London in 1796. He studied under Sir Charles Bell, at the royal academy, and in Rome, and spent many years in Egypt and Syria. He was the first to point out the monument erected by Sesostris on the coast of Syria, as mentioned by Herodotus, and has written on Egyptian archæology for various publications of learned societies. His works include "Nineveh and its Palaces: the Discov-

eries of Botta and Layard applied to the Elucidation of Holy Writ," with contributions by Lepsius and other Egyptologists (illustrated, London, 1852; 3d ed., 1857), and "The Sarcophagus of Oimeneptah I. described by Samuel Sharpe" (1864). Mr. Bonomi is curator of Sir Hans Sloane's museum, London.

BONONCINI, or *Buononcini*, *Giovanni Battista*, an Italian composer, born at Modena about 1670, died after 1752. He became known at Vienna as a composer of operas, and the royal academy of music invited him to London to compose for the stage. Handel was invited at the same time, and the two became rivals in popular favor, the Tories favoring Handel and the Whigs Bononcini. The former steadily gained the ascendancy, and Bononcini became a pensioner on the duchess of Marlborough, who had led his admirers. Having palmed off a madrigal as his own which he had merely copied, he was obliged to leave London, and was subsequently composer for the chapel of the king at Paris. He finally went to Venice, where all trace of him is lost. None of his operas have retained their popularity.

BONPLAND, *Alm  *, a French traveller and naturalist, born at La Rochelle, Aug. 22, 1773, died in Uruguay in May, 1858. He studied medicine, and served as a surgeon in the navy during the French revolution. He afterward pursued scientific studies with Humboldt at Paris, and accompanied that naturalist on his travels in Mexico and South America. They were absent five years, and on their return in 1804 Bonpland presented his collection of plants, numbering 6,000, to the museum of natural history. Napoleon gave him a pension, and the empress placed him in charge of her gardens at Malmaison. While in this position he published descriptions of the plants which he had collected, with illustrations. After the fall of the emperor he embarked again for South America, landing in Buenos Ayres in 1816 with a large collection of European plants and seeds. He was made professor of natural history in that city, and remained there five years. He then set out to carry on new explorations among the Andes, but was intercepted by Dr. Francia, the dictator of Paraguay, and detained for nearly ten years, during which time he was compelled to act as physician to a garrison. On his release in 1831 he retired to a plantation near San Borja on the southern boundary of Brazil, where he married an Indian woman and devoted himself to cultivating Paraguay tea. In 1853 he removed to a larger estate at Santa Anna, where he raised orange trees. During all this time he made collections of plants and wrote descriptions of them, which he intended to take to the museum at Paris, had he not been prevented by death. His most important contribution to Humboldt's *Voyage des r  gions   quinoxiales* is *Nova Genera et Species Plantarum*, edited by C. S. Kunth (7 vols. fol., 1815-'25). His biography has been written by Adolphe Br  nel (Paris, 1872).

BONSTETTEN, *Charles Victor de*, a Swiss author, born in Bern, Sept. 8, 1745, died in Geneva, Feb. 3, 1832. Before the revolution he took part in public affairs and interested himself in social and political questions. Afterward he travelled extensively, writing letters, sketches, and books on a variety of subjects, both in French and German. He was acquainted with nearly all the distinguished persons of his time, and left some unfinished *Souvenirs*, in which he intended to record his reminiscences of them. His principal works are *Recherches sur la nature et les lois de l'imagination* (Geneva, 1807), and *  tudes de l'homme* (Geneva, 1821).

BONVICINO, *Alessandro*, called *Il Moretto da Brescia*, an Italian painter, born in Brescia early in the 16th century, died about 1560. Being a pupil of Titian and a careful student of the works of Raphael, he succeeded to a remarkable degree in combining the excellences of the two. He painted several historical pictures of celebrity, but excelled mainly in portraits.

BONZES, a term applied to the priests of Fo or Buddha in China, Japan, Cochin China,



Japanese Bonzes.

Burmah, &c. They are divided into various sects, but their teachings are much alike, and they have many customs in common. They profess celibacy, practise austerities of various kinds, and dwell together in monasteries. They always go with the head bare and closely shaven, and wear no beard. They are supposed to lead a life of prayer and contemplation, and at intervals teach the mass of worshippers in their temples. Among their moral teachings are strict honesty, chastity, and temperance. In their public devotions they use idols, some of them very hideous, but the real

object of worship is an invisible spirit. There are female bonzes who live in convents, and to whom the education of girls is sometimes intrusted.

BOOBY, the English name for a genus of *pelecanidae*, the *dysporus* of Illiger, *morus* of Vieillot, *le fou* of the French; separated from the true pelicans by Brisson, under the name of *sula*. The term booby is applied by navigators to that species (*sula fusca*, Briss.) which inhabits the desolate islands and coasts of warm climates in almost every part of the globe. The old voyagers have left accounts perfectly consentaneous concerning the stupidity of these birds, and testify to the passive immobility with which they sit in rows, two and two, along the shores, and suffer themselves to be beaten to death with clubs, attempting only a weak defence by pecking at their aggressors, and never making so much as an effort to take wing. Dampier says that in the Alacrane islands, on the coast of Yucatan, the crowds of these birds were so great that he could not pass their haunts without being inconvenienced by their pecking. He also states that he succeeded in making some fly away by the blows which he bestowed on them; but the greater part remained in spite of all his efforts to compel them to take flight. The boobies seldom



Booby (*Sula fusca*).

swim and never dive, but take fish by darting down from on high, with unerring aim, upon such kinds as swim near the surface, and instantly rising again into the air with their booty. In the performance of this exploit they are often harassed and persecuted by the frigate birds and albatrosses, which give chase to them the instant they see them rising laden with their prey, and force them to disgorge it, when they themselves appropriate the fish. Recognizing the similar habit of the whiteheaded eagle toward the osprey, of the great arctic gull toward the fishing terns, and of other predatory birds toward their more industrious and peaceful congeners, there is

no reason for doubting the truth of this story. They walk with extreme difficulty, and while at rest on land stand nearly erect, propped, like the penguins, on the stiff feathers of the tail. The omission of all efforts for self-preservation by this bird is to be attributed not to stupidity, but to inability to get away, the extreme length of its wings and comparative shortness of its legs rendering it difficult for the bird to rise at all from a level surface, and almost impossible to do so in a hurry. They ordinarily lay their eggs, each bird two or three, in rude nests on ledges of rock covered with herbage; but Dampier states that in the isle of Aves they build nests in trees, though they have been always observed in other places to nest on the ground.

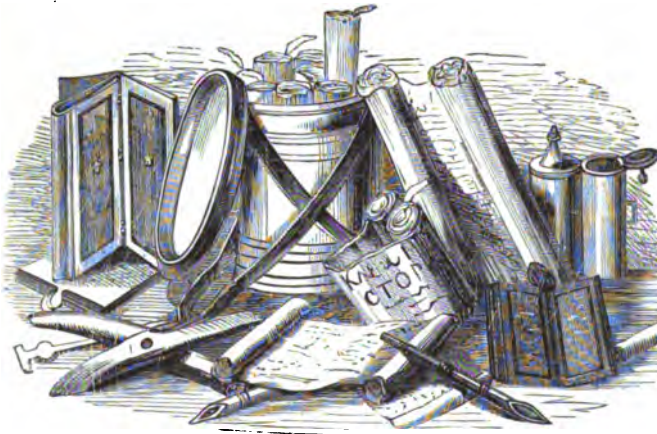
BOODEROOM. See HALICARNASSUS.

BOOK, by the law of England, is "construed to mean and include every volume, part or division of a volume, pamphlet, sheet of letterpress, sheet of music, map, chart, or plan separately published." The word comes to us from the Saxon *bōc*, "beech," because the Saxons usually wrote upon beechen boards; just as the Latin *liber* denoted originally the inner bark of a tree, which was employed for the same purpose. It has, however, received an application anterior to its own origin, and is also used with reference to written tablets of stone and metal. In its widest sense it dates from the most remote antiquity. The ten commandments were written on slabs of stone; the Babylonians and Egyptians traced inscriptions on bricks and rocks. Sheets of wood, ivory, and various metals, and subsequently a great variety of pliable substances, animal and vegetable, crude and prepared, have been used for the purpose. The bark of the birch forms a very good writing material; and the leaves of the talipot palm are to this day used by the Cingalese for large books; the writing is performed with a sharp metallic point, and a black pigment is rubbed into the lines. In the library of the university of Göttingen is a Bible of this kind containing 5,873 leaves. Among the Greeks and Romans books of wood were common. For the more important purposes they also employed ivory, as well as bronze and other metals; and for common business, such as the recording of contracts and the making of wills, and for the courtesies of social life, the letters of love or friendship, they had sheets of wood, covered with wax, to be written upon with a *stylus*, and protected from contact by a raised margin, or opposite projections in the centres. Many specimens of ancient books still exist, which prove, without historical evidence, how various are the materials which suffice for the wants of man in an unlettered age. The most ancient books extant, with the possible exception of a few Egyptian papyri, are probably those brought from the ruins of the palace of Koyunjik, at Nineveh, dating from about 667 B. C. They consist of tablets of burned clay, some 9 inches by 6½, others much smaller, covered

with cuneiform characters, sometimes so minute as to be almost illegible without a magnifying glass; they had been impressed upon the moist clay, which was afterward baked. So numerous were they that the floors of two rooms were covered a foot deep with them. They had been originally paged and placed in cases. In the destruction of the palace they were broken; but there were four copies of each, so that what is wanting in one is often supplied by another. This library is now in the British museum. The antiquary Montfaucon in 1699 purchased at Rome a leaden book of six thin leaves, about 4 inches long by 8 wide, with hinges and clasps of the same material; it contained Egyptian Gnostic figures, and other unintelligible writing. Among the Calmuck Tartars was found a collection of books that were long and narrow, the leaves very thick and made of bark covered with varnish, the ink being white on a black ground. M. Santander

transcription, and elaborateness of ornamentation, but upon the favor in which particular authors happened to be held, seems to have gone to each extreme; instances of extraordinary cheapness standing side by side with others of almost incredible dearness. According to Böckh, in Athens, "a small book (*γραμματοῖον*) for the purpose of recording a contract, that is, a small, commonly wooden diptychon, consisting of two wax tablets, was estimated by Demosthenes at two chalci (one quarter of an obolus, less than one cent). Wooden tablets (*σπίδης*), on which accounts were written, cost, Olymp. 98, 2 (B. C. 407), a drachma (about 18 cents) apiece. These must have been pretty large and well made. Two pieces of papyrus for copying an account cost at the same time two dr. four ob. (45½ cents). Paper appears from this to have been very dear, although written books were cheap since the books of Anaxagoras, even when dear, were

to be had for a drachma; or else the paper upon which public accounts were written was uncommonly good." It is also stated that Plato, who was not rich, bought three books of Philolaus the Pythagorean for 10,000 denarii (about \$1,600); and it is further said that Aristotle paid three Attic talents (nearly \$3,000) for a few books which had belonged to the philosopher Speusippus. But these apparent contradictions may be easily reconciled by a consideration of the probable conditions



Ancient Books and Writing Implements.

possessed a beautiful Hebrew Pentateuch, written on 57 skins of leather, sewed together with threads or strips of the same material; it formed a roll 113 French feet in length.—The shape of wooden and metal books was square, but when more convenient material, such as parchment and papyrus, was introduced, the cylindrical form was adopted. The sheets, fastened together at the edges, were attached to a staff, round which they were rolled; whence our word volume, from *volvere*, to roll. At each end of the staff was a boss by which it could be turned, and the volume was read by unrolling the scroll so as to expose successively its several sheets. The title was written generally in red, on fine vellum, and pasted on the outside. Scrolls were again superseded by square books. Modifications in form accompanied the various changes made in material, until the shape and general proportions which now prevail were adopted.—The value of books, depending not only upon beauty of chirography, accuracy of

that occasionally existed; the number of certain works reducing them to the value of the transcriber's labor, or less, when supply exceeded demand, while the rarity of others gave a practical monopoly to their possessors.—At Rome the manufacture of books, which under the early emperors had been constantly increasing, diminished during the troubles of the empire, and upon its fall was for a long time entirely extinguished; to revive again after many years, but under greatly altered circumstances. In the dark ages the material for writing became scarce. The supply of papyrus from Egypt failed, and paper had not been introduced from the East. Parchment was almost the only accessible material, and for this the demand far exceeded the supply. Hence arose the practice of erasing the original writing from the parchment so that it could be used again. The erasure was usually made by rubbing with pumice stone; but as the coloring matter of the ink penetrated a little into the texture of the

parchment, the erasure was seldom complete, and the original writing can often be made out. Several valuable works have thus been recovered. A manuscript of this kind is termed a palimpsest (Gr. *παλινψητος*, from *πάλλω*, again, and *ψέν*, to rub off). Had not paper, properly so called, been already common in Europe, the invention of printing, superseding the labor of the copyist, would have been of little value for the multiplication of books.—In the earliest times books had been ornamented; but in the middle ages they reached the acme, if not of beauty and convenience, at least of cost. In the process of preparation books then received the most careful attention. In the monasteries the monks were not only transcribers, illuminators, and binders, but the same individual frequently combined the triple function in his own person. From the hands of the scribe the book passed to the illuminator, and from him to the binder, by whom its ponderous proportions were encased in massive covers of wood and leather, studded with knobs and bands, often of gold and silver, and closed with broad clasps. When publicly exposed, they were frequently secured by chains; nearly every great library contains books, often printed ones, with the chains still attached. Books were protected by special statutes; were subjects of grave negotiations; were solemnly bequeathed by will; and were lent only to the higher orders, who were compelled to deposit ample pledges for their return. Even so late as 1471 Louis XI. was compelled by the faculty of medicine at Paris to deposit a valuable security, and give a responsible indorser, in order to obtain the loan of the works of the Arabian physician Rhazes. Among the illustrations of cost which the industry of bibliographers has collected, we find that St. Jerome, to procure the works of Origen, impoverished his estate; that King Alfred gave for one book eight hides of land (480 to 960 acres); that the countess of Anjou paid for a copy of the homilies of Bishop Huiman, besides other articles of barter, 200 sheep. Stowe says that in 1274 a Bible finely written sold for 50 marks (about £34), at a time when wheat was 5*d.* a bushel, and labor 1*d.* a day; in 1400 a copy of Jean de Mehun's "Romance of the Rose" was publicly sold at Paris for 40 crowns (more than \$150). But, according to a document in the monastery of St. Stephen at Caen, the works of Peter Lombard were bought in 1431 for 7 francs. It is thus difficult to ascertain the prices of books as determined by the value of material and labor at remote periods; for the peculiar instances which have been placed on record are more likely to refer to exceptional and accidental conditions than to the ordinary and usual rates affixed by the understood laws of trade. Something of the same kind occurs in our own time; a book whose intrinsic value is but a few shillings, has often been sold for scores or even hundreds of pounds. (See BIBLIOMANIA.)—Printing made

no immediate or violent innovation upon the then existing order of things. Types were made to imitate the products of the slower process of writing, and the general appearance of MS. volumes was carefully imitated, so that for some time books still continued inaccessible to the people. But the desire for books was almost imperceptibly growing, the gradually widening demand keeping pace with and encouraging the development of mechanical skill. Copies were multiplied with increasing rapidity and diminishing cost, and their sale becoming larger, while it reduced the proportionate expense, enlarged the aggregate profits of the maker. Nevertheless, in Europe, even long after the invention of printing, books were beyond the reach of the people, even had they been able to read. In China, and probably in Japan, printed books have been common and cheap from time immemorial. Their method of printing, which has undergone no important change for generations, enables them to produce a book much more cheaply than it could have been done with us half a century ago. Twenty-five or thirty pages for a cent is, and appears to have long been, a common price for an ordinary book; a cent, however, representing a much greater value there than here.—With us the manufacture of a book demands a large outlay of capital and the aid of various branches of mechanical skill. Strictly speaking, the making of a book begins with the author who writes it, or, as in the case of a collective work like a cyclopædia or a gazetteer, the corps of editors, writers, and revisers. Then follow, in regular sequence, the compositor, proof-reader, pressman, and binder; and if the work is one of which a considerable number is to be printed, and is illustrated, the stereotyper or electrotyper, and the engraver on wood, copper, steel, or stone (lithographer), or perhaps two or more of them, will also be called into requisition. (See BOOKBINDING, CORRECTION OF THE PRESS, ELECTRO-MAGNETISM, ENGRAVING, LITHOGRAPHY, and PRINTING.) In respect to the size of their pages books receive several designations. Originally these denoted the number of leaves into which each sheet was folded. In a folio, the sheet was folded once, making two leaves; in a quarto (4to), twice; in an octavo (8vo), three times, making 8 leaves; in a duodecimo (12mo) the sheet made 12 leaves, but four leaves had to be cut off from one end of the sheet, folded separately, and placed in the centre of the other part, when folded. These terms are now used only in a general way, to indicate the size of a book. The introduction of power presses permitting the use of larger sheets, it is very rarely that a work is now printed in folio, or even in quarto, although a volume of very large size is still styled a quarto. This Cyclopædia is a large octavo; a volume somewhat smaller is simply an octavo; the next smaller size is crown octavo; then come duodecimo, 18mo, 32mo, and so on.—All printers are not pub-

lishers or booksellers; and all booksellers are not printers. The distinction is this: A printer is one who prints a book, either for himself or for another; a bookseller is one who vends books, either at retail or by wholesale, whether printed by himself or another; a publisher is one who prepares a book for the market, and issues it to the public. A few publishers confine themselves exclusively to the sale of the books issued by themselves, but most of them also buy and sell the books of others; so that while all booksellers are not publishers, all publishers are booksellers. Few authors have the facilities requisite for getting up their works and placing them before the public. For this they must avail themselves of the agency of the publisher, who usually undertakes all the expense, and so demands a share in the profits. The author's pecuniary right in his book is termed a copyright, that is, the exclusive right to produce a copy of it, for a certain period, and under certain conditions prescribed by the law, which creates this exclusive right. (See COPYRIGHT.) Usually the author disposes of his copyright to a publisher; sometimes he sells it outright for a stipulated sum; generally he prefers to receive a certain portion of the profits. This varies greatly, but the most common rate is 10 per cent. on the retail price of each copy sold. Some authors obtain much more; and in the case of school books, which are usually sold at a small advance upon the cost of production, the author's percentage is often smaller. In Great Britain a frequent arrangement is that the author and publisher shall divide the net profits equally; but this is liable to the objection that it is not easy to fix the expenses belonging to each separate book, and there is always a contingent risk that a part of the copies may remain unsold, or that bad debts may be incurred. By the American method the publisher usually assumes all risks, and the amount due the author can be at any moment ascertained.—The first regular bookseller in the United States appears to have been Hezekiah Usher, who was in business in Boston as early as 1652. He was succeeded by his son, John Usher, who in 1686 was described as a "trader who makes the best figure in Boston; he's very rich, adventures at sea, but has got his estate by bookselling." Books were mainly imported, and were kept in shops with other wares; thus Benedict Arnold sold drugs and books; usually, however, the occupations of printer, bookbinder, and bookseller were combined. In 1732 Richard Fry, a Boston bookseller, advertised that he had printed "the most beautiful poems of Mr. Stephen Duck, the famous Wiltshire poet," and considered the fact that he had sold 1,200 of these poems "a full demonstration that the people of New England have a fine taste for good sense and polite learning." Toward the close of the last century bookselling began to assume a prominent place among commercial pursuits. About 1820 it began to increase rapidly, and

it has since more than kept pace with the increase of population. In the 12 years from 1830 to 1842, the entire number of books printed in the United States was about 1,800, an average of over 100 a year, about equally divided between original works and reprints. The number of publications steadily increased from year to year. In 1853 there were 879 new books and new editions, of which 298 were reprints of English works, and 87 translations from other languages. In 1855 the new books and new editions were 1,092; of which 250 were reprints of English books, and 38 translations. During the years 1859-'60 the number of books averaged about 1,350 a year. The civil war somewhat checked the book trade, but it revived after its close. In 1871 the number of books published in the United States was about 3,000; of which 50 may be designated as works of reference, 350 theology, 80 mental and moral philosophy, 200 political and social science, 200 education, 300 history, geography, and travels, 450 sciences and arts, 200 fine arts and recreation, 350 general literature, 570 juvenile, and 300 fiction. Many of these works comprise several volumes, so that the number of volumes is about 3,500. The value of the books manufactured in the United States in 1820 is estimated at \$2,500,000; in 1830, \$3,500,000; in 1840, \$5,500,000; in 1850, \$12,500,000; in 1856, \$16,000,000; in 1871 it can hardly be less than \$40,000,000.—The cost of producing each copy of a book depends greatly upon the number printed, for there is a certain expense for setting the type, &c., which must be incurred, no matter whether the number be great or small. This in the case of an ordinary 12mo may be set down at \$750. If 1,000 copies be printed, it will be 75 cents a copy; if 5,000 copies, 15 cents a copy; if 10,000 copies, 7½ cents a copy. The paper, printing, and binding of each copy of such a work cost about 40 cents, or somewhat less for very large numbers. If, now, 1,000 copies are printed, the cost of the mere manufacture of each will be \$1 15; if 5,000 are printed, 55 cents; if 10,000, 47½ cents. The usual retail price of such a book is \$1 50; and deducting the discount to the trade, and certain inevitable minor expenses, the publisher receives \$1 a copy. His account would stand thus: For 1,000 copies—cost \$1,150, receipts \$1,000, loss \$150; for 5,000 copies—cost \$2,750, receipts \$5,000, profits \$2,250; for 10,000 copies—cost \$4,750, receipts \$10,000, profits \$5,250. From these must be deducted, in the case of an original work, the author's copyright of 15 cents a volume. This on 5,000 copies is \$750; on 10,000, \$1,500. The apparent profits of the publisher are twice those of the author on 5,000 copies, and two and a half times on 10,000; but out of this must come the expenses of conducting business, cost of advertising, losses by bad debts, and the cost of unsold copies. In a fairly successful book, the net profits of the publisher are

about equal to those of the author; in the exceptional cases of a very large sale, they are usually considerably greater; but the authors of such works command more than the usual copyright, so large occasionally as to absorb the greater part of the profits, in which case the publisher is in effect merely the business agent of the author. Still it is true that every purchaser of a book, as a rule, pays more to the paper maker, the printer, and the binder, respectively, than to the author. A successful publisher, indeed, usually receives more than a successful author; for the reason that the former derives his income from scores, hundreds, or thousands of different works, while the latter derives his from only the few which he has himself written.—The great majority of individual volumes have only a brief life. Of those printed more than 20 years ago probably not one in five now exists. The others, by steps more or less rapid, have found their way to the flames or the waste basket, and thence to the paper mill, whence their material substance reappears in the shape of paper or bookbinders' boards.

BOOKBINDING, the art by which the material parts of a book are connected for convenience in use and protection from injury. Its antiquity is coeval with the art of composing books, for from whatever materials ancient books were made—wood, slate, horn, plates of lead or copper, the leaves or bark of trees—the necessity arose of uniting the several parts together for more ready reference as well as their better preservation. The art probably first consisted in fastening together sheets of wood or metal by means of hinges. Afterward, when the more pliable substances papyrus and parchment were substituted, the sheets were fastened together at the edges and fixed at one end to a scroll round which they were rolled. The bookbinder then as now prepared the volume, made the staff, affixed the bosses and the title, and embellished the outside as his own or his patron's taste might suggest. Dibdin, on the authority of Trotzius, an ancient scribe, asserts that Phillatius was the discoverer of a substance for making the sheets adhere together, and that the Athenians erected a statue in his honor. He also says, on the authority of Vossius, that King Attalus of Pergamus first ordered the squaring of books, and that this gave rise to the folding into twos and fours, or folios and quartos; and after the folding, gathering, and glueing of the book, covers of board, vellum, or leather naturally followed.—Bookbinding involves considerable mechanical skill and knowledge of decorative art; for from its commencement it has gone beyond the mere necessities of utility, often to heights of notable extravagance. In respect of expense the limits have never been defined, ostentatious display having at times superseded the binder proper by the goldsmith and lapidary. Thus St. Jerome exclaims: "Your books are covered with precious stones, and Christ died naked

before the gate of his temple." Jewels and precious metals, the finest stuffs and the most gorgeous colors, united to give a material value, frequently without any elegance of design or chasteness of taste. All great public collections show with pride some of these rare and venerable bindings, decorated with gold and inlaid with precious stones, cameos, or antique ivories. The cathedral of Milan contains in its treasury the covering of a book of a date prior to the 12th century, 14 inches long and 12 inches wide, profusely covered with incrustated enamel, mounted and ornamented with polished but uncut precious stones of various colors. Skelton's description, though purely fanciful, will convey an idea of what was in his time acceptable as the perfection of book decoration:

With that of the boke losende were the clasps:
The margent was illumynid all with golden ralles
And byes, enpicturid with gressoppes and waspila,
With butterflys and freshe peocke tayls;
Enflord with flowris and almyr snyvis;
Enuyld picturis well towchid and quikly;
It wolde haue made a man hole that had be ryght sekely,
To beholde how it was garnyschyd and bounde,
Encouerde ouer with golde of tisseu fyne;
The clasps and bullyons were worth a thousande pounde;
With balaisis and charbuncles the borders did alyne;
With *aurum muscum* every other lyne
Was wryten.

This mode of decoration, however, was the work of goldsmiths, enamellers, &c., and quite foreign to the bookbinder's art. In specimens of oriental binding brought home by the crusaders, European workmen found models for the dyeing, stamping, and gilding of leather, which did much to advance the art. A marked change in the character of binding and its decoration took place as books began to multiply by the invention of printing. To such patrons as Grolier, De Thou, and Maioli, of the sixteenth century, binders are indebted for those chaste and elegant designs which form their best examples at the present day. Since that period many styles have sprung into existence which have each their admirers, the Harleian, Montagu, Roxburghe, &c. In our own times bookbinding has wonderfully improved in style, design, and cheapness. France, England, and America have each characteristically contributed toward this improvement, while Germany, where printing was invented, has lagged behind. France has excelled in her taste and finish, England in solidity and strength without sacrifice of flexibility, and America by the invention and use of machinery vastly increasing the speed of production, a single bindery in New York being capable of producing 10,000 bound books a day.—The introduction of cloth binding is an important feature in the progress of the art. The number of modern publications and the extent of the editions necessitated a style both economical and rapid in its production. To Mr. Pickering, the London publisher, and Mr. Leighton, the binder, belongs the credit of its introduction about 40 years ago. The paper label was its first and only ornament,

afterward the title in gold; but now it receives the most elaborate gilding, and of late years elegant and emblematic designs of ink and gold in combination are produced. This style has given rise to the greater part of the machinery used in bookbinding, and to the United States the credit of the invention of three fourths of it belongs. Sheep skin is extensively used, but morocco, russia leather, and calf form the covers of the more expensive binding. Occasionally velvet, ivory, and mother-of-pearl are used for Bibles and books intended for presentation.—There are two kinds of binding, a description of which will suffice to give a general idea of the mechanical processes through which a book passes after leaving the printer, before it is completed for sale. The first is cloth-case binding, the cheapest, and that in which machinery is most employed; the other is known as extra binding, the work on which is principally performed by hand. Taking the volume in which this article appears as an example, we shall first describe the manner in which it is bound in cloth. Books derive a technical name descriptive of size from the leaves into which each printed sheet is folded, such as folio, quarto, octavo, duodecimo, &c. At the foot of the first page of each sheet is a number or letter, called the signature, by which the order is designated. This volume is called a royal 8vo, being printed on paper a size larger than the ordinary 8vo, and is printed on nearly 50 sheets, each containing 8 leaves or 16 pages. These sheets go to the binder in quires, and are first taken to the sheet room, where the work of folding, gathering, collating, and sewing is done by females. The whole edition of each sheet is folded by one girl with astonishing rapidity and accuracy. The most expert will fold about 400 an hour, but the average is



FIG. 1.—Folding Machine.

perhaps 300. Folding machines (see fig. 1) are now in general use capable of folding 10,000 or 12,000 sheets a day. After having been folded, the sheets are laid in piles, according to the order of the signatures, on the gathering table,

from which they are taken one by one by the gatherer with the right hand, and then placed in the left, until a whole set is collected. This process, as well as that of folding, is performed with wonderful quickness, the gathering of

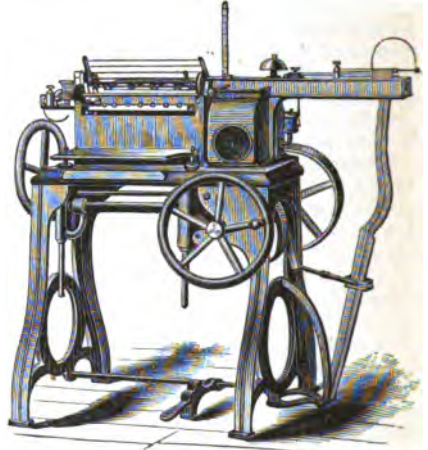


FIG. 2.—Book-Sewing Machine.

25,000 sheets a day being not unusual for an active girl. After this the sheets are knocked up evenly and examined by the collator, who looks at each signature to insure that the volume is complete, each sheet being in its proper order without duplicates or deficiencies. Being found perfect, the book is pressed in a smashing machine, by which the delay of the screw or hydraulic press formerly employed is avoided. It now passes to the sawing machine, preparatory to sewing. Several volumes are taken together, and in an instant five revolving saws make as many cuts in the backs, of a size sufficient to admit the bands of twine to which the sheets are sewed. The sewer has a wooden frame, which consists of a table with two upright screws supporting a horizontal and adjustable rod, to which three strong bands fastened on the table are attached, at distances corresponding to the three inner saw marks. She then places the first sheet against the bands and passes her needle from the first cut or kettle stitch to the inside of the sheet, then out and in at every band, embracing each with the thread until the bottom is reached, then sews the next sheet in the same manner but in an opposite direction, and so on alternating until the last. Within the last year (1872) book-sewing machines (see fig. 2) have been successfully introduced in America, which effect an average saving of one half the cost of hand sewing, and are simple and perfect in their operation. Henry G. Thompson of Connecticut is the patentee. End papers are now pasted on the book, which then leaves the sheet room, where about 1,000 are so prepared in a day. In the forwarding room, which it enters

next, its further progress is effected mainly by the aid of machinery. It is first prepared for the cutting machine, and, after its fore edge has been cut, is glued and rounded by the workman, then returns to be cut on the ends, after which a piece of muslin is pasted over the back nearly as long as the book, but extending about an inch over its sides to give strength to the joints. A backing machine then spreads the back and forms a groove for the boards; two paper linings are now glued to the back, and the book is ready for its cover, which has in the mean time been prepared in another department. The case or cover is simply and expeditiously made, and is composed of mill boards cut a little larger than the size of the book, strips of paper the exact length and width of the back, and the cloth cut sufficiently large to turn over all. The cloth is glued, and one board placed upon it, then the paper at a short distance to allow for the joint, then the other board, after which the corners of the cloth are cut, the edges turned over, and it is rubbed smoothly down. When dry, it is given to the stamper, who letters it in gold and embosses the sides. The letters are engraved on a metal stamp, and the impression is made in an embossing press, heated by steam. Gold leaf is laid on the cover, and the heated stamp causes it to adhere where desired, the unused gold being afterward wiped off with a rubber. Then the book is pasted on the sides, placed in the cover, and pressed till dry. This completes the process of case binding, which is distinguished more particularly from extra binding in having the book forwarded separate from its cover; and it may be useful to learn that some bookbinders pursue the same plan with morocco as with cloth, producing inferior work, not readily detected by the purchaser until after the volume has been some time in use.—Morocco or other extra binding will now be described. Though folded and gathered the same as the cloth copy, greater care is taken in pressing, and it is sewed in a different manner. The back is not sawed, but the bands, to the number of five in this volume, have their positions indicated by pencil marks. Instead of passing the needle out at the upper and in at the lower side, merely drawing them to the book, it is passed out at the lower and in at the upper, completely encircling the band, and forming a flexible hinge for the sheet. This is called flexible or raised band sewing, and constitutes one of the distinguishing features of strong binding, being not only important but indispensable. The forwarder now receives the volume, pastes on and breaks up the end papers, glues the back, and when dry rounds it; after which the backing boards are placed on the sides a short distance from the back, and it is then screwed up in the laying press, and the back hammered very carefully, so as to spread the sheets on each side of the backing boards, at the same time not wrinkling the inside. By this process grooves are formed for

the mill boards, which, being cut of the desired size, are placed on the sides, and the book is subjected to a powerful pressure, during which the refuse glue is soaked off with paste, and the back is rubbed smooth and left to harden. It is now in shape, but with all the leaves uncut. No new machine has yet been made to supersede the old press and plough for cutting a book "in boards." The mill boards are put close in the joints and even with the head of the book, the front board placed as much below the head as may be desired; the book is fixed tightly in the press, the head of the front board being on a level with it, and the head is cut; the same operation is repeated for the foot or tail, the boards being left larger than the book in order to overlay and protect the edges. The fore edge is formed differently. A cord is wound tightly round the volume parallel with and close to the back, which is then beaten flat, and the fore edge cut straight; and upon the release of the book from the cord by which it is bound, the back resumes its round, and the fore edge becomes grooved. The edges are now gilded, for which purpose, the books being pressed, they are scraped smooth, and covered with a preparation of red chalk as a groundwork for the size, a mixture of the white of egg and water, in the proportion of one egg to about half a pint of water. The gold is laid on the size, allowed to dry, and then burnished with an agate or bloodstone. Before being covered, head bands of silk are fixed to each end of the back, projecting a little beyond the sheets, and making the back the same length as the boards. The boards are bevelled at the edges, by means of a machine which grinds them with emery dust. The cover, pared thin, is now pasted on and drawn tightly over, but is afterward taken off for convenience in turning in the edges. The back, which has no lining, is well pasted, the cover drawn on again, the bands well nipped up, and great care is taken to make the leather adhere firmly to the back, and to set the boards closely and well forward in the joints. A book thus sewed and covered possesses the primary essentials of strong binding. The ornamenting or finishing is much a matter of taste within certain limits. The process by which decorative impressions are made on the outside of a book is called tooling, and when gold is not used blind tooling. A beautiful effect is produced on morocco by the latter, making those glossy black indentations which so tastefully contrast with the rich color of the leather. For this purpose the tools or stamps are heated and applied repeatedly to the morocco, which has been made thoroughly wet. End papers being neatly pasted to the boards, the book is finished.—The foregoing will serve to point out the several processes through which the sheets pass before the book is completed, as well as to exhibit the distinguishing characteristics of the two principal styles of binding. The hollow or spring back, which is in much favor,

and adapted in a superior degree to books in calf, is yet subject to rupture, and demands the binder's best attention. By securing the back always with muslin instead of paper, its strength will be greatly increased. India-rubber binding, by which the leaves are fastened together with a cement of caoutchouc, though admirably adapted for allowing engravings to be opened to their full extent, is a failure for want of strength.

BOOKKEEPING, the method of exhibiting in a clear and concise manner the state of a man's pecuniary affairs. The system of bookkeeping in general use among men of business, called the "Italian method," from the country of its invention, and "double entry," from the construction of its ledger, is of great antiquity. The first treatise on the subject was written by Luca Pacioli, better known as Luca di Borgo (Venice, 1495). The first German treatise on bookkeeping was written by Johann Gottlieb (Nuremberg, 1531). In 1548 Hugh Oldcastle produced at London "A profitable Treatise to learn to knowe the good order of the keeping of the famous reconynge, called in Latin, *Dare et habere*, and in Englyshe, Debitour and Creditor." In 1602 a work in French on double entry appeared at Leyden, followed in 1652 by Collins's "Introduction to Merchants' Accounts." Mair's "Bookkeeping Modernized," the most elaborate exposition of the old Italian school published, appeared the following century, and passed through many editions. In 1789 Benjamin Booth modified the system, introduced many valuable improvements, and gave to the world the first and best work extant on the modern practice of monthly journalizing, under the title of "A Complete System of Bookkeeping," an improved mode of double entry, comprising a regular series of transactions, as they have occurred in actual business.—The following are the fundamental principles upon which the science of double entry is based: The essentials of this art consist in the classification and arrangement of data in a book called the ledger. Each collection of data is called an account. An account, whether of persons or things, is a statement of all the transactions whereby the property of the concern has been affected by the person or thing in question. The accounts are designated by distinct titles, and articles of opposite kinds are placed in opposite columns. The space which an account occupies in the ledger being vertically divided, the left-hand side is denominated debtor and the right-hand side creditor. These terms, when applied to the personal accounts, are used in their ordinary sense; but when applied to an impersonal account, they have a more extended signification. All debit items are not sums owing to the concern, nor are all credit items sums owing by the concern; in short, the terms Dr. and Cr. serve merely to distinguish the left from the right-hand side of an account, and the arithmetical signs *plus* and *minus* would equally answer

this purpose. The nature and object of the principal accounts in a merchant's ledger are briefly as follows: 1. The receipts and payments of money are recorded under the title of cash. All receipts are entered in the left or debtor money column, and all payments in the right-hand or creditor money column. The difference between the two sides, technically called the balance, represents the cash in hand. 2. Written securities, such as drafts, notes, or acceptances, received by the merchant, and for the payment of which other parties are responsible, are recorded under the title of bills receivable, and those issued or accepted by the merchant, for the payment of which he is responsible, are recorded under the title of bills payable; the former account invariably represents assets, and the latter liabilities, in the shape of bills. 3. An account must be opened for each person or firm with whom the merchant has dealings on trust under their respective names, or the name of the firm with which they are connected. The design of a personal account is to show what is owing to or by the person in question. The terms debtor and creditor are here used in their ordinary sense; since each person is made debtor for what he owes, and creditor for what is owing to him. 4. Purchases and sales are recorded under the name of the specific property bought or sold; the cost or outlay being entered on the debtor side, and the sales or returns, as well as the value unsold, at the time the accounts are adjusted, on the credit side. The result is gain or loss as the case may be. 5. The capital invested in business, in the outset, is recorded under the title of stock, or capital stock, and the gains and losses under the double title of profit and loss. Commission, charges, interest, and the like are merely subdivisions of the profit and loss, and the latter is simply a branch of the stock account. The stock account exhibits the capital collectively, that is, in one mass; the other accounts exhibit its component parts. The fundamental law of double entry is this: every transaction which affects or modifies the capital, or its component parts, must be twice entered; that is, to the debit of one or more accounts, and *vice versa*. When the accounts are completed, there remains the last process, which consists in balancing the books; that is, in closing and equilibrating the several accounts, and in collecting the results, so as to exhibit in a concise form the gains and losses, the assets and debts, and the present capital. This is generally done at stated intervals on a balance sheet which contains every account of the ledger. Every transaction in business being virtually a transfer between two accounts, it must be entered to the debit of the one and to the credit of the other; these two balancing entries are made in the ledger, and comprise all that is scientific in the system of double entry. The entries in the primary books are merely preparatory arrangements, totally

unconnected with the principle and proof of accounts. The most indispensable preliminary in the process of bookkeeping is the registration of all the data of which the accounts are composed in chronological order, and in language as clear and concise as possible. The subsidiary books in general use are: The cash book, which contains a daily record of the receipts and payments of money; the bill book, which contains a daily record of the bills, notes, or acceptances received and issued; the invoice book, which contains the particulars of goods purchased, and is simply a transcript of the invoices or bills of parcels; the sales book, which contains the particulars of goods sold on credit, or shipped abroad on consignment; the day book, which is used to record such transactions as do not properly belong to either of the other subsidiary books. The journal is a record of the transactions compiled from the subsidiary books, daily, weekly, or monthly, as may be expedient. The rules for distinguishing the accounts which are to be debited and credited are inferred from the arrangement of the ledger. The thing received, or the person accountable to you, is debtor; the thing delivered, or the person to whom you are accountable, is creditor; thus: 1. The person to whom anything is delivered is debtor to the thing delivered when nothing is received in return. Therefore, when money is paid, the receiver is debtor to cash; when goods are sold upon credit, the purchaser is debtor to goods. 2. The thing received is debtor to the person from whom it is received when nothing is delivered in return. Therefore, when money is received, cash is debtor to the payer; when goods are bought on credit, goods are debtor to the seller. 3. The thing received is debtor to the thing given for it. Therefore, goods bought for ready money are debtor to cash; when goods are sold for ready money, cash is debtor to goods. 4. When one person delivers anything to another on your account, the person who receives the value is debtor, and the person who gives it creditor.

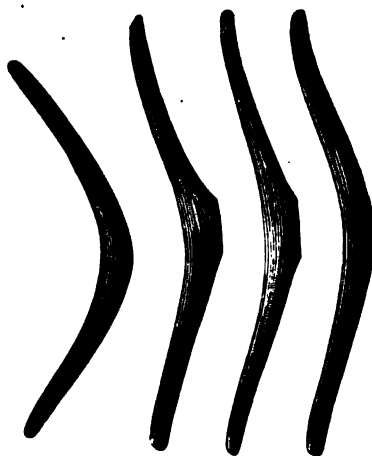
BOOLAK, *Boulak*, or *Bulak*, a town of Egypt, on the Nile, 1 m. N. W. of Cairo, of which it is the port; pop. about 5,000. In 1799 it was burned by the French. Mehemet Ali rebuilt it, and established extensive cotton-spinning, weaving, and printing works, a school of engineering, and a printing establishment, renowned for its productions in Arabic, Persian, and Turkish, from which is issued a weekly newspaper in Arabic. The town contains a naval arsenal, a dockyard, and a custom house, and is surrounded by the country residences of numerous Egyptian grandees.

BOOLUNDSEAHUR, or *Boolundshahur*. I. A British district of Hindostan, in the Northwest Provinces, division of Meerut; area, 1,828 sq. m.; pop. about 800,000, more than three fourths Hindoos. It has a level surface, sloping gradually to the southeast, with a slight ridge rising between the courses of the Jumna

and the Ganges, which, with the Hindon and the East Kali-Nuddee, are the principal rivers of the district. The climate is subject to extremes unusual in that latitude. Domestic quadrupeds attain scarcely half the size of those in Bengal and Bahar. Cotton grows well, and constitutes the staple production. The other products are indigo, sugar, tobacco, wheat, barley, millet, and several kinds of pulse. Boolundshahur formed part of the territory acquired by the French adventurer Peron. He was routed by the British in 1808, when this district and other possessions were ceded to the East India company. II. Or *Burrut*, the chief town of the district, situated on the Kali-Nuddee, 40 m. S. E. of Delhi; pop. 12,000. It has a bazaar and considerable traffic. It was one of the centres of the sepoy rebellion of 1857.

BOOM, a town of Belgium, in the province and 10 m. S. of Antwerp; pop. in 1866, 10,064. It is situated on the Rupel, at the junction of the Brussels canal, and has an active transit trade. It contains a college, brick and tile works, tanneries, breweries, and various other manufactures.

BOOMERANG, *Bomerang*, or *Womera*, a missile for war, sport, or the chase, used by the aborigines of Australia. It consists of a piece of very hard wood about 2 ft. long, $2\frac{1}{4}$ inches wide, and $\frac{1}{4}$ of an inch thick, bent to a parabolic curve, the ends rounded, and one side con-



Boomerangs.

vex, while the other is flat. It is taken in the hand by one end, with the convex edge forward and the flat side up, and projected as if to hit an object directly in advance. It gradually rises, rotating rapidly, and finally takes a retrograde motion and falls behind the projector. Its effective use requires a skill that Europeans find it next to impossible to acquire.

BOONDEE, or *Bundl*. I. A native state of Rajpootana, Hindostan, under British protection, separated from Kotah on the E. by the

Chumbul, and bounded S. by Sindia's territory; area, 2,291 sq. m.; pop. about 250,000. A range of mountains traverses it from N. E. to S. W., on each side of which the surface is level. The climate is unhealthy, fevers, rheumatism, ophthalmia, and bronchial affections being very prevalent. The majority of the inhabitants are Meenas, a predatory tribe, dwelling chiefly among the mountains, and supposed to be the early possessors of the district. The dominant tribe, however, to which the sovereign belongs, is that of the Haras. The territory subject to the rajah of Boondee was anciently of much greater extent than at present, and was called Haraoti. It is said to have been wrested from the Meenas by Rao Dewa in 1342. It was dismembered by Jehangir at the end of the 16th century, and the territory of Kotah set apart for a descendant of a former rajah. Other portions of the territory were lost in 1804, and in 1817 more than half the revenues were usurped by Holkar and Sindia. The rajah of Boondee having aided the British in the Mahratta and Pindaree wars, a treaty of alliance and friendship was made in 1818, by which Boondee regained its revenues and a portion of its lost domain. The importance of this state is due to the fact that it contains the principal passes to upper Hindostan from the south. II. The capital of the state, situated in a valley surrounded by rocky hills, 22 m. N. W. of Kotah, and 245 m. S. S. W. of Delhi; lat. 25° 28' N., lon. 75° 30' E. It is encompassed by walls with three massive gates, and inhabited chiefly by native Haras. Its advantages as a commercial town are very few, but the beauty of its situation, its antiquity, numerous temples, handsome fountains, and palaces, invest it with considerable interest. The residence of the rajah, which is a collection of splendid structures reared by different sovereigns, and each bearing the name of its founder, stands on the slope of a hill overlooking the town. The town is divided into old and new Boondee, the former of which is in a state of decay.

BOONE, the name of counties in seven of the United States. I. A S. W. county of W. Virginia, bounded N. E. by Coal river, a tributary of the Kanawha, and drained by its branches; area, about 500 sq. m.; pop. in 1870, 4,558, of whom 153 were colored. Its surface is hilly, and to a great extent covered with forests. The chief productions in 1870 were 2,585 bushels of wheat, 129,630 of Indian corn, 13,667 of oats, 12,043 of potatoes, 6,213 lbs. of tobacco, 9,699 of wool, 55,784 of butter, and 22,547 of honey. There were 565 horses, 1,356 milch cows, 2,448 other cattle, 8,955 sheep, and 4,848 swine. Capital, Ballardsville. II. A N. county of Arkansas, bordering on Missouri; area, about 800 sq. m.; pop. in 1870, 7,082, of whom 74 were colored. White river flows through the N. E. corner of the county. Most of the land is fertile and diversified. Excellent variegated marble is found.

The chief productions in 1870 were 41,940 bushels of wheat, 341,042 of Indian corn, 22,837 of oats, 12,394 Irish and 10,027 sweet potatoes, 206 bales of cotton, 56,365 lbs. of tobacco, 9,449 of wool, and 92,958 of butter. There were 2,247 horses, 2,161 milch cows, 4,041 other cattle, 5,557 sheep, and 22,486 swine. Jackson township is the temporary capital. III. A N. county of Kentucky, separated from Ohio and Indiana by the Ohio river; area, 300 sq. m.; pop. in 1870, 10,696, of whom 1,012 were colored. The surface is hilly and the soil fertile, resting upon a basis of blue limestone. The Louisville, Cincinnati, and Lexington railroad passes through the S. E. corner. The chief productions in 1870 were 98,424 bushels of wheat, 32,621 of rye, 770,505 of Indian corn, 86,441 of oats, 81,518 of potatoes, 279,740 lbs. of tobacco, 36,661 of wool, and 198,511 of butter. There were 4,709 horses, 2,918 milch cows, 5,580 other cattle, 11,278 sheep, and 31,466 swine. Capital, Burlington. IV. A central county of Indiana, drained by Eagle and Sugar creeks; area, 408 sq. m.; pop. in 1870, 22,593. The Indianapolis, Cincinnati, and Lafayette railroad passes through the centre of the county, and the Indianapolis, Bloomington, and Western through the S. W. corner. The surface is either level or moderately uneven, and the soil deep and fertile. The chief productions in 1870 were 388,352 bushels of wheat, 14,337 of rye, 749,482 of Indian corn, 52,075 of oats, 48,278 of potatoes, 68,607 lbs. of wool, 261,816 of butter, and 30,743 gallons of sorghum molasses. There were 7,902 horses, 5,147 milch cows, 8,643 other cattle, 23,095 sheep, and 27,109 swine. Capital, Lebanon. V. A N. county of Illinois, bordering on Wisconsin, intersected by Kishwaukee river; area, 270 sq. m.; pop. in 1870, 12,942. It has a rolling surface, diversified by fertile prairie lands and forests. The Kenosha, the Galena, and the Madison divisions of the Chicago and Northwestern railroad pass through the county; and there is also a branch railroad from Belvidere to Beloit. The chief productions in 1870 were 241,641 bushels of wheat, 35,871 of rye, 466,985 of Indian corn, 579,127 of oats, 52,355 of barley, 167,311 of potatoes, 31,323 tons of hay, 555,159 lbs. of butter, 17,810 of cheese, and 80,598 of wool. There were 6,309 horses, 7,088 milch cows, 7,966 other cattle, 20,810 sheep and 7,849 swine. Capital, Belvidere. VI. A central county of Iowa, watered by Des Moines and Snake rivers and Beaver creek; area, 576 sq. m.; pop. in 1870, 14,584. The Chicago and Northwestern railroad traverses the county, and the Des Moines valley line touches its S. W. corner. Forests occupy a considerable portion of the surface. The soil is highly productive. Coal is abundant. The chief productions in 1870 were 176,969 bushels of wheat, 727,831 of Indian corn, 151,272 of oats, 63,541 of potatoes, 22,019 tons of hay, 20,825 lbs. of wool, and 256,549 of butter. There

were 3,740 horses, 8,636 milch cows, 5,844 other cattle, 11,788 sheep, and 10,182 swine. Capital, Boonesboro. VII. A N. E. county of Missouri, bounded S. W. by the Missouri river; area, 648 sq. m.; pop. in 1870, 20,765, of whom 4,088 were colored. The Northern Missouri railroad and the Columbia branch pass through the county. The surface is slightly uneven, and consists mainly of prairies interspersed with forests. The soil is uniformly productive. Stone coal and limestone are the principal minerals. The chief productions in 1870 were 235,750 bushels of wheat, 1,096,114 of Indian corn, 260,019 of oats, 149,634 lbs. of tobacco, and 74,552 of wool. There were 7,218 horses, 2,709 mules and asses, 5,441 milch cows, 9,541 other cattle, 21,037 sheep, and 30,169 swine. Capital, Columbia.

BOONE, Daniel, an American pioneer, born in Bucks co., Penn., Feb. 11, 1735, died at Charette, Mo., Sept. 26, 1820. His father, Squire Boone, came from England and took up his residence in a frontier settlement in Pennsylvania, where Daniel received the merest rudiments of education, but became thoroughly familiar with the arts and hardships of pioneer life. When he was 18 years old the family moved to the banks of the river Yadkin in North Carolina, where he married Rebecca Bryan and passed some years as a farmer. He made several hunting excursions into the wilderness, and finally in 1769 set out with five others to explore the border region of Kentucky. They halted on the Red river, a branch of the Kentucky, where they hunted for several months. In December, 1769, Boone and a companion named Stewart were captured by the Indians, but escaped, and Boone was soon after joined by his brother. They were captured again, and Stewart was killed; but Boone escaped, and, his brother going shortly after to North Carolina, he was left alone for several weeks in the wilderness, with only his rifle for a means of support. He was rejoined by his brother, and they continued their explorations till March, 1771, when they returned home with the spoils which they had collected. In 1773 he sold his farm and set out with his family and two brothers and five other families to make his home in Kentucky. They were intercepted by Indians and forced to retreat to the Clinch river near the border of Virginia, where they remained for some time, Boone in the meanwhile conducting a party of surveyors into Kentucky for the governor of Virginia. He was afterward appointed, with the commission of a captain, to command three garrisons on the Ohio, to keep back the hostile Indians, and in 1775 was employed to lay out lands in Kentucky for the Transylvania company. He erected a stockade fort on the Kentucky river, which he called Boonesborough, and removed his family to the new settlement, where he was again employed in command of a force to repel the Indians. In 1778 he went to the Blue Licks to obtain salt for the settle-

ment, and was captured and taken to Detroit. His knowledge of the Indian character enabled him to gain favor with his captors, and he was adopted into one of their families. Discovering a plan laid by the British for an Indian attack upon Boonesborough, he contrived to escape and set out for the Kentucky settlement, which he reached in less than five days. His family, supposing that he was dead, had returned to North Carolina, but he at once put the garrison in order and successfully repelled the attack which was soon made. He was court-martialled for surrendering his party at the Licks, and for endeavoring to make a treaty with the Indians before the attack on the fort; but conducting his own defence, he was acquitted and promoted to the rank of major. In 1780 he brought his family back to Boonesborough, and continued to live there till 1792. At that time Kentucky was admitted into the Union as a state, and much litigation arose about the titles of settlers to their lands. Boone, losing all his possessions for want of a clear title, retired in disgust into the wilderness of Missouri, settling on the Femme Osage river, 45 m. W. of St. Louis, where he lived from 1795 to 1804. This region was then under the dominion of Spain, and he was appointed commandant of the Femme Osage district and received a large tract of land for his services, which he also lost subsequently because he failed to make his title good. His claim to another tract of land was confirmed by congress in 1812 in consideration of his eminent public services. The latter years of his life he spent in Missouri with his son-in-law Flanders Callaway. The only original portrait of Boone in existence was painted by Mr. Chester Harding in 1820, and now hangs in the state house of Kentucky. The remains of Boone and his wife were exhumed in 1845 and deposited with appropriate ceremonies in the cemetery of Frankfort, Ky. An account of Boone's adventures, as related by himself, was written out by John Filson (1784), and reprinted in the supplement to Finlay's "Description of the Western Territory" (1798). There is a life of Boone by John M. Peck in Sparks's "Library of American Biography." Lives of him have also been written by Timothy Flint, W. H. Bogart, and J. S. C. Abbott.

BOONE, William Jones, D. D., first missionary bishop of the Protestant Episcopal church at Shanghai, China, born in South Carolina, July 1, 1813, died at Shanghai, July 17, 1864. He graduated at the college of South Carolina, studied law under Chancellor De Saussure, and was admitted to the bar, but soon after studied for the ministry at the theological seminary of Virginia, and was ordained in 1835. During the following two years he studied medicine at the South Carolina medical college, and received his degree in 1837. Appointed early the same year a missionary to China, he sailed with his wife, and reached Batavia in October. He thenceforward devoted all his energies to the

acquisition of the Chinese language, and in time became one of the first scholars of modern times in that difficult tongue. In 1840 he removed to Macao for the benefit of his health, and two years later to Amoy, where his wife died in August, 1842. By desire of the foreign committee on missions, he returned to the United States in the summer of 1843, and was consecrated missionary bishop for China, Oct. 22, 1844. Taking with him several assistants, Bishop Boone reached Shanghai in June, 1845. He was especially occupied in translating the prayer book into Chinese, and, in connection with the missionaries from other denominations, in securing an accurate version of the Bible. It was in this work that his knowledge of the language was especially conspicuous. On two occasions, in 1852 and 1857, he returned home for the benefit of his health. Having succeeded in getting the mission to Japan under way, he returned to China in December, 1859. Severe domestic afflictions and other trials in connection with his mission, as well as incessant labors, soon broke down his feeble health and terminated his life.

BOONESBOROUGH, a decayed village of Madison co., Kentucky. In 1775 the first fort erected in Kentucky was built here by Daniel Boone. In Boonesborough was convened, toward the end of last century, the first legislative assembly ever held in the territories now forming the western states.

BOONTON, a town of Morris county, N. J., on the Rockaway river, at the terminus of a branch of the Morris and Essex railroad, and on the Morris canal, 40 m. N. W. of New York; pop. in 1870, 3,458. The town is situated in a mountainous region, the canal here overcoming a perpendicular elevation of 80 feet. The Delaware, Lackawanna, and Western railroad passes through it. The Boonton iron works, from which the place derives its chief importance, cover about 60 acres of ground, and include 14 large buildings, several offices and stores, and extensive sheds. Every branch of production is carried on, from the smelting of ores to the manufacture of the machinery and tools used in the establishment. There are two blast furnaces, which together produce about 450 tons of pig iron per week, the greater part of which is manufactured in the works. The proprietors own and operate the mines at Dover from which the ores are obtained. These are of the New Jersey magnetic variety, yield from 50 to 75 per cent. of iron, and contain but little sulphur. The product consists largely of gray and mottled iron of fine grain, available for both forge and foundry purposes. Connected with the blast furnace is a chemical laboratory, in which all the materials used are analyzed. The rolling mills contain 12 double puddling and 11 heating furnaces, and 6 trains of rolls. They produce chiefly the plate iron from which nails are cut, while of bar iron the production is limited to the requirements of the nut and bolt factory which forms a part of the establishment.

The two nail mills are the most important portion of the works, and contain 138 machines, which produce 100 kegs of nails an hour. About 300,000 kegs are used annually for packing the nails, and 20,000 for bolts and nuts, of which about 1,000 tons are produced annually. The keg mill connected with the establishment consumes yearly about 1,000,000 feet of heading stuff and 1,500 cords of stave timber. The only steam engines in the works are those which furnish the blast for the furnaces. The power that drives the machinery is furnished by the Morris canal, the water of which, after revolving a large overshot wheel in the nail factory, passes to the rolling mills, which have two large iron overshot wheels and four turbines, and thence into the canal again. In the old town of Boonetown, which was swept away early in the present century by the bursting of the dam across Rockaway river, was built in 1770 the first nail mill in the United States, which, notwithstanding opposition from the British authorities, was worked successfully for many years. There are no locks on the canal at this point, but the boats are transferred from one level to the other by means of an inclined plane 500 ft. long, upon which is laid a track of about 9 ft. gauge. The transfer is effected with great rapidity by means of an eight-wheeled cradle, capable of holding a canal boat, which is drawn along this track by a turbine wheel at the top of the incline. Boonton contains several churches and schools, and a weekly newspaper.

BOONVILLE, a city and the capital of Cooper co., Missouri, on the right bank of the Missouri river, 48 m. N. W. of Jefferson City; pop. in 1870, 3,506. It is situated in the midst of a rich farming region, in the vicinity of iron, lead, and coal mines, and of marble and limestone quarries. The grape is extensively cultivated. Boonville is the centre for most of the trade of S. W. Missouri, of a portion of Arkansas, and of the Cherokee nation. It has a court house, several churches, ropewalks, and four weekly newspapers, one of which is in German. It was settled by Daniel Boone.

BOORHANPOOR, or **Burhanpoor**, a town of British India, formerly capital of Candeish, in the territory of Gwalior, 130 m. S. S. E. of Oojein and 210 m. E. of Surat; lat. 21° 19' N., lon. 76° 18' E.; pop. about 20,000. It stands on the north bank of the Taptee, 60 or 70 feet above the stream, and is surrounded by a brick rampart in the form of a semicircle, in the centre of which is a palace of brick, called the Red Fort. It was built by Akbar, with pleasure gardens, halls of white marble, and a mosque; but it is now fast falling to ruin. The town itself contains but one edifice of much pretension, which is a mosque built by Aurungzebe. The streets are wide and regular, and many of the houses neat and commodious. The trade is almost monopolized by a Mohammedan tribe called the Borahs, who came originally from Arabia, and still retain the dress and

many of the customs of that country. They manufacture muslins, flowered silks, and brocades, and in the time of Tavernier (about 1665) used to export considerable quantities of their fabrics to Persia, Egypt, Turkey, Russia, and Poland, though even then Boorhanpoor had passed the meridian of its prosperity. The vicinity is noted for excellent grapes. This town was founded about 1414 by Malik Nasir, ruler of Candeish, and for a long time was the capital of the country. In 1599 it was besieged and taken by Akbar, king of Delhi, who reduced Candeish to a province of his empire. It was plundered by the Mahrattas in the reign of Aurangzebe in 1685, and in 1720 was wrested from the empire of Delhi by Azaf Jah or Nizam ul-Mulk, viceroy of the Deccan. It was subjugated by Madhajeo Sindia in the latter part of the 18th century; was occupied by the British under Col. Stevenson in 1803, restored the same year, and finally with the whole of Sindia's territory, or Gwalior, passed under British protection in 1844.

BOORO, Bouru, or Boeroe, an island of the Malay archipelago between lat. 3° and 4° S., and lon. 126° and 127° E.; area, about 2,000 sq. m.; pop. 100,000. The surface is mountainous, the highest peak, Mount Donel, rising 10,400 feet; the soil is fertile, producing rice, sago, fruits, aromatic plants, and dyewoods. The island is well watered, and abounds with deer and babyrussa hogs. Fort Defence, on the E. side, is a Dutch station; on the north is Oajeli bay, where plentiful supplies can be obtained.

BOOTAN, or Bhotan, an independent territory of India, between lat. $26^{\circ} 30'$ and $28^{\circ} 30'$ N., and lon. $88^{\circ} 30'$ and 92° E., on the N. E. frontier of Bengal, among the Himalaya mountains, which separate it from Thibet on the N., and branch out over a great part of its surface. It is bounded E. by a region inhabited by savage mountain tribes, S. by the British districts of Assam and Goalpara, and the native state of Cooch-Bahar, and W. by the native state of Sikkim; length from E. to W., 215 m.; breadth, 115 m.; area, 19,180 sq. m. Some of the highest summits of the Himalaya chain lie on its N. border, from which the surface sinks by broken and abrupt descents to the Brahmapootra. The rivers are numerous, and have violent cataracts. The most important of them traverse the country from N. to S., and fall into the Brahmapootra. There are many bridges over the torrents, some of which are of very ingenious construction. In the lower part of the country the vegetation presents the usual features of the tropics; higher up are forests of pine, birch, maple, and yew, while the hills are covered with fruits common to Europe, such as apples, apricots, and berries. The soil in many places is well tilled. Rice, wheat, barley, turnips, gourds, and melons are raised in large quantities. The trade is chiefly with Bengal and Thibet; the exports comprise rice, wheat, flour, horses, linen, musk, and fruits; and the imports, cattle, hogs, dried fish, tobacco, cot-

ton, woollens, indigo, tea, gold, silver, and embroideries. Iron and copper are found, but not in large quantities. The inhabitants are tall, with smooth, dark skins, high cheek



Bootans.

bones, and the broad faces common to the Chinese and Tartars. Though courageous when attacked, they are by no means a warlike people, and have little knowledge of military art. They are industrious and devoted almost altogether to agriculture. The climate in the valleys at the foot of the Himalaya is very unhealthy. The religion is Buddhism, and there are many priests and monasteries, but morality is at a very low ebb. Polyandry and polygamy are both general, and no religious ceremony is observed in marriage. There are two sovereigns, one spiritual, called the *dhurma rajah*, and the other secular, known as the *deb rajah*. The chief towns are Tassisudon, Wandipoor, Poonakha, Ghassa, Paro, and Muri-chom; but for the most part the people live in small villages.—In ancient Brahmanical legends Bootan is called Madra. Up to the last century little is known with regard to its political condition. In 1772 the Booteahs ravaged the territory of Cooch-Bahar, whereupon the latter state applied to the British for assistance, which being granted, the rajah of Bootan was attacked within his own dominions, defeated, and forced to solicit aid from Thibet. By the mediation of the latter state, a treaty of peace was concluded in 1774. The British suffered severely for many years from the incursions of the Booteahs into the Dooars, a strip of fertile frontier country at the foot of the mountain passes leading from Bootan into Assam and Bengal. The Assam Dooars were occupied by the British in 1841, a rent being paid for them to the Bootan government. As

the depredations continued on the Bengal frontier, the Hon. Ashley Eden was sent as an ambassador to the two rajahs in 1863. He was violently maltreated on the route, and at the capital, Poonakha, and only allowed to return after signing on compulsion a treaty ceding the Assam Dooars. This treaty was at once repudiated by the British government, war was proclaimed (1864), and in a short campaign (1864-'5) the forts commanding the passes were reduced, and the Dooars, 150 m. long and 80 to 40 m. wide, were annexed by treaty to the British possessions.

BOÖTES, in astronomy, a constellation in the northern hemisphere. The name is derived from the Greek *βοῦς*, an ox, and means an ox-driver. The modern figures represent Boötes as a man with a club in the right hand, and in the left the leash which holds two hunting dogs. It contains Arcturus, a star of the first magnitude.

BOOTH, Barton, an English actor, born in Lancashire in 1681, died in London, May 10, 1738. His father was a near relative of the earl of Warrington. The son ran away from the university of Cambridge and joined a company of strolling players. He appeared in Dublin in 1698 with great success in the character of Oronoko, and was afterward engaged at the Drury Lane theatre, London, under the management of Betterton. He was the favorite tragic actor of the day, gaining especial celebrity as Cato in Addison's play, and as the ghost in "Hamlet." He was highly esteemed for his attainments and character.

BOOTH, Sir Felix, an English manufacturer, born in 1775, died in 1850. He was head of the firm of Booth and company, distillers in London, and gave £20,000 in 1827 to aid the arctic expedition under Sir John Ross. For this public-spirited act he was made a baronet in 1834. Ross's expedition resulted in the discovery of the true position of the north magnetic pole, and of a large tract of country which was named Boothia Felix.

BOOTH. I. Junius Brutus, a tragedian, born in London, May 1, 1796, died on the passage from New Orleans to Cincinnati, Dec. 1, 1852. His father was a solicitor, his mother a descendant or relative of John Wilkes. He entered the navy at an early age, but soon changed from this to a printing office, afterward began the study of law, made some creditable attempts as a painter and sculptor, and finally went upon the stage, his first appearance being Dec. 18, 1818. After playing at minor theatres in England and on the continent, he made his début at Covent Garden theatre in October, 1815. He afterward played in provincial theatres, and having made a hit as Sir Giles Overreach, he was reengaged at Covent Garden, where he appeared, Feb. 12, 1817, as Richard III. Edmund Kean, ten years his senior, had just made his appearance at Drury Lane theatre, the manager of which induced Booth to leave the rival house, and appear at his own on

the same nights with Kean. In "Othello" each took alternately the characters of Othello and Iago. This engagement was brief. Booth returned to Covent Garden, where he met with an unfriendly reception, but soon gained great favor, especially as Richard III., Sir Giles Overreach, and Lear. In 1820 he again appeared as leading actor at Drury Lane. He afterward went to Amsterdam, and then to Madeira, whence he suddenly sailed to America, arriving at Norfolk, Va., in July, 1821. His residence was thereafter in the United States, and for a period of 80 years he played in nearly every theatre in the country. In 1824 he purchased a farm at Belair, 20 m. from Baltimore, where he resided when not occupied by professional engagements. His range of characters was limited, embracing only those which he had studied in early life. Richard III., Iago, and Sir Giles Overreach were his favorite parts, although he excelled in Othello, Lear, Shylock, Hamlet, and Sir Edward Mortimer. His personifications were marked by an intensity which placed him in the first rank of tragedians, but his irregular habits very often interfered with his success. Notwithstanding this, he retained much of his vigor to the close of his life. **II. Edwin**, an American actor, son of the preceding, born at Belair, Md., in November, 1838. He was educated for the stage, supporting his father in inferior parts from his boyhood, and made his first regular appearance at the Boston museum in 1849 in a minor part in "Richard III." On occasion of his father's illness in 1851, he took his place and performed Richard III. at the Chatham street theatre, New York. In the following year he went to California and engaged for "utility business," and in 1854 made a visit to Australia, stopping at the Sandwich Islands on his way. He returned in 1857 and appeared at Burton's theatre, New York, in leading tragic parts. At the same theatre, under its new name of the Winter Garden, he gained a high reputation in 1860 for his delineation of Shakspearian characters. He visited England in 1861, appearing at the Haymarket theatre, London, and passed a year on the continent in studying his art. Returning to America in the fall of 1862, he entered upon a brilliant dramatic career, gaining great celebrity by his impersonation of Hamlet, Othello, Iago, Richard III., and other Shakspearian parts, and of Richelieu in Bulwer's drama of that name. In 1869 he built a theatre in New York, which has become celebrated for the presentation of standard dramas with great perfection of detail. **III. John Wilkes**, brother of the preceding, an actor and the assassin of Abraham Lincoln, born at Belair, Md., in 1839, died near Bowling Green, Va., April 26, 1865. He appeared on the stage at an early age, but with indifferent success. During the civil war he passionately sympathized with the South, and near its close entered into a conspiracy to assassinate President Lincoln, the vice presi-

dent, and some members of the cabinet. On the evening of April 14, 1865, the president was at the theatre in Washington. Booth gained access to his box, discharged a fatal pistol shot into the head of the president, and leaped upon the stage, breaking one of his legs. He reached the private entrance of the theatre, where a horse was in readiness for him, and with an accomplice rode 80 m. into Maryland. Here he stopped to have his fractured leg set by a physician, and then crossed the Potomac into Virginia. A party of pursuers overtook him before daybreak of the 26th at Garrett's farm, near Bowling Green, about 20 m. from Fredericksburg. He had taken refuge in a barn, and refusing to surrender, was shot, dying soon after. (See LINCOLN.)

BOOTHAUK, a fortified village of Afghanistan, 12 m. E. of Cabool, and at the commencement of a series of defiles between that place and Jelalabad. Here the Afghans made an attack upon the British army in January, 1842, during the disastrous retreat from Cabool, and literally annihilated it. The pass of Boothauk is 5 m. long, and in its narrowest parts, where it is but 50 ft. wide, is hemmed in by perpendicular cliffs 500 ft. high.

BOOTHBAY, a township of Lincoln co., Maine, on the coast, between the Damariscotta and Sheepscott rivers; pop. in 1870, 3,200. Its harbor is one of the best on the coast, and is never frozen over in the winter. The inhabitants are extensively engaged in ship building, the foreign and coasting trade, and the fisheries. Ferries connect the town with Bristol and with Southport, an island in the bay.

BOOTHIA FELIX, a peninsula forming the most northerly part of the North American continent, between lat. 69° and 75° N., and lon. 92° and 97° W. It is connected with the mainland by the isthmus of Boothia. It was discovered by Capt. James Ross, and named by him in honor of Sir Felix Booth. Ross here determined the position of the magnetic pole.

BOOTHIA GULF, a continuation to the southward of Prince Regent inlet, in British America. It separates Boothia Felix from Cockburn island and Melville peninsula, and is about 810 m. long and from 60 to 100 m. broad.

BOOTON, an island in the eastern archipelago, S. E. of Celebes, lat. 5° S., lon. 123° E., about 85 m. long by 20 m. wide. It is governed by its own prince; the inhabitants are Mohammedans. The island is mountainous and woody, but portions are well cultivated. There is a bay on the E. side of the island, into which in calm weather vessels are liable to be drawn by the current, which is so strong that once fairly in, it is said, they can only escape in the western monsoon. The Dutch East India company formerly maintained a settlement here.

BOPP, Franz, a German philologist, born at Mentz, Sept. 14, 1791, died in Berlin, Oct. 23, 1867. He began his studies at Aschaffenburg, went to Paris in 1812, and devoted several years to the study of the oriental languages

and literature, receiving encouragement and assistance from Chézy, Sylvestre de Sacy, and August Wilhelm von Schlegel. He afterward went to London to pursue his investigations, and finally passed some time at Göttingen, receiving a small pension from the king of Bavaria. On his return to Prussia in 1821 he was appointed professor of oriental languages in the university of Berlin, where he spent the remainder of his life. His first publication was a work on the Sanskrit verb, which was followed by a grammar and glossary of that language. He also published some Sanskrit poems and a portion of the epic *Mahabharata*, giving the original text with translations. The great work of his life, and one that may be said to have laid the foundation of the science of comparative philology, is his *Vergleichende Grammatik des Sanskrit, Zend, Griechischen, Lateinischen, Litauischen, Altalavischen, Gothischen und Deutschen* (5 vols., Berlin, 1833-'52; new ed., entirely recast and enlarged by the addition of the Armenian, 1857). A third edition was published after his death (1868-'71). In this work he traced back the Indo-European languages to their origin, and pointed out their present relations to each other. It has been translated into French and English. He wrote also on the relations of the Malayan and Polynesian languages to those of the Indo-European system, and on the Celtic, the Albanian, and the Caucasian languages. In honor of his memory the *Bopp-Stiftung* has been founded at Berlin, to promote the study of comparative philology. His library has been purchased by Cornell university, Ithaca, N. Y.

BOPPARD, or **Boppard** (anc. *Bandobrica* or *Bontobrica*), a walled town of Rhenish Prussia,



Boppard.

on the left bank of the Rhine, 9 m. S. of Coblenz; pop. in 1871, 4,977. It owed its origin to a fort supposed to have been built by Drusus. Its streets are narrow and antiquated,

and it contains two fine Gothic churches and two hydropathic establishments, one of which occupies the former abbey of Marienberg. The town has some trade and manufactories of cotton, tobacco, and leather.

BORA, *Katharina von*, the wife of Martin Luther, born at Löben, near Merseburg, Jan. 29, 1499, died at Torgau, Dec. 20, 1552. In her youth she was placed in the Cistercian convent of Nimptschen, near Grimma, in Saxony. Here she read some of the works of Luther, which inspired her with great enthusiasm, and she applied to him for aid in leaving the cloister. Through the instrumentality of Leonhard Koppe, a native of Torgau, Luther succeeded in securing the escape of Katharina and eight companions on the night of April 4, 1523. They fled first to Torgau, then to Wittenberg. As their parents refused to take them home, Luther provided for them as best he could. Some of them found employment as teachers, others married. Katharina became an inmate of the house of the burgomaster of Wittenberg, and on June 13, 1525, Luther married her. After his death she had the friendship and aid of Christian III., king of Denmark, and John Frederick of Saxony. She left three sons and two daughters.

BORACIC ACID. See BORIC ACID.

BORACITE, or *Borazite*, a mineral occurring in crystals imbedded in gypsum and anhydrite in Hanover, Holstein, and France; also impure in the salt mines of Stassfurt. It was formerly supposed to be composed of magnesium borate, but recent analyses have shown that it also contains chlorine. According to Potyka, a fair average sample has the following constitution:

Magnesia.....	26.19
Oxide of iron.....	1.66
Boric acid.....	61.19
Chloride of magnesium.....	10.41
Water.....	0.94

100.39

BORAGE (*borago*), a plant and the typical genus of the order *boraginaceæ*. Calyx 5, rarely 4-parted, and persistent; corolla hypogynous, monopetalous, rotate, 5, rarely 4-cleft, imbricate in æstivation; stamens inserted on the tube of the corolla, exserted, alternate with the segments of the corolla; anthers oblong or lanceolate, extrose, conniving in a cone around the style, awned; ovary 4-parted, carpels or nutlets 4, 1-seeded, 1-celled, distinct, seeds exalbuminous. Herbs or



Borage (*Borago officinalis*).

shrubs with alternate, exstipitate leaves, usually rough; flowers in spikes, panicles, or corymbs, rarely solitary in the axils. *B. officinalis* originally came from Aleppo, but is now thoroughly naturalized in central Europe and England. Corolla blue or purple, sometimes white, or with different colors on the same stem; tube of the corolla with emarginate rotate scales; nuts ovate-oblong, ribbed, the ribs denticulate. The plant was once in great repute, being reckoned one of the four cordial flowers, with alkanet, violets, and roses. A decoction of its leaves with honey was used as a pectoral medicine, and the drink called in England cool tankards is made of the succulent, mucilaginous stems. The juice contains much nitre, and to this is probably due the cooling quality of the plant. The young and tender leaves are used for pickles or as a salad, and hence borage is much cultivated in some cities of Europe.

BORAX (Arabic, *bārak*), a salt first mentioned by Geber in the 10th century; its chemical nature was discovered by Geoffroy in 1732. It is largely prepared from the natural product boric acid, and is itself found native in various parts of the world. The anhydrous borax, or borate of sodium, has the formula $\text{Na}_2\text{B}_4\text{O}_7$, and is composed in 100 parts of boric anhydride (B_2O_3) 69.05, soda (Na_2O) 30.95. It is found native in some Alpine lakes, in the snowy mountains of India, China, and Persia, in Ceylon, and especially in the lake of Teshu-Lumbu in Great Thibet. This lake is distant 15 days' journey from a town of the same name, and it formerly furnished large quantities of borax. Is also occurs in still greater quantities near Potosí in Bolivia; in Pyramid lake, Lake co., Nevada, and near Columbus, Esmeralda co., in the same state; also in Borax lake, California. The supply at the last named places seems to be inexhaustible. Formerly a large quantity of the borax formed by the spontaneous evaporation through the sun's heat of the waters of borax lakes, was imported into Europe under the name of *tincal*, *tincana*, *swaga*, or *pounza*. It appears in small hexagonal crystals more or less flattened out, either colorless or having a yellowish or greenish tinge, with an earthy crust. It has a greasy feel, and smells like soap. The crude borax was first refined in Venice, where for a long time the process was kept a secret. Afterward it was also refined in Holland. At Lake Clear in California, 250 m. N. of San Francisco, where 4,000 lbs. of borax per day is produced, the muck which contains it is obtained by dredging, dried in the sun, and the borax dissolved out and crystallized.—The purification of tincal may be accomplished in various ways. The oldest method was to place it on a wire sieve or bolter and wash it with a lye containing 5 per cent. of soda so long as the liquor ran through colored. This removed all fatty substances that might adhere to it, forming a very soluble soap. After allowing the borax to drain, it is dissolved in boiling water, 12 per cent. of crystallized

carbonate of soda added, and the solution filtered. It is then evaporated to the specific gravity of 18° to 20° B., and allowed to crystallize in wooden vessels well lined with lead. In order to obtain single, well formed crystals, and to prevent a crust forming, the liquor must cool very slowly. Another process consists in pouring over the tincal a small quantity of cold water, and gradually adding, while stirring, 1 per cent. of caustic lime. Some time after boiling water is added and the liquor strained. The greasy substances that contaminated the tincal remain behind as an insoluble lime soap. Two per cent. chloride of calcium is added, and it is again strained and allowed to crystallize. Clouet reduces the tincal to a fine powder, mixes with 10 per cent. of nitrate of sodium, and calcines the mixture in an iron pan over a gentle fire, thus burning out all the fatty matter. The calcined mass is then dissolved in water, the solution separated from the carbon left behind, evaporated, and the crude borax crystallized out. Its varying crystalline form depending on the amount of water it contains, borax is divided into (1) the common or prismatic (natural or artificial), and (2) the octahedral, containing but half as much water of crystallization. Prismatic borax ($\text{Na}_2\text{B}_4\text{O}_7 + 10\text{H}_2\text{O}$) consists in 100 parts of boric acid 36.6, soda 16.2, water of crystallization 47.2. Octahedral borax ($\text{Na}_2\text{B}_4\text{O}_7 + 5\text{H}_2\text{O}$) contains boric acid and soda 69.36, water of crystallization 30.64.—Prismatic borax is made as follows: About 26 cwt. of sal soda is dissolved in 400 gallons of water, placed in a large tightly closed vat lined with lead. The solution is caused to boil by a jet of steam entering it. About 24 cwt. of crude boric acid is introduced, in portions of 9 or 10 lbs. at a time, through a tube dipping under the surface of the liquor. A discharge pipe conducts off the carbonic acid, together with some carbonate of ammonia formed at the same time, the ammonia being retained by passing it through dilute sulphuric acid. The solution is brought to a density of 21° to 22° B. by the addition of either crude borax or water as may be required. The solution is allowed to settle and drawn off into the crystallizing vessels, also lined with lead, and left two or three days, the crystals placed on an inclined plane to drain, and then recrystallized, the mother liquor being used to dissolve a fresh quantity of soda. After using this mother liquor three or four times, it contains sufficient Glauber's salt for it to crystallize out, when cooled below 38° C., at which point it is most soluble. The crude borax is purified by recrystallization, 5 per cent. of carbonate of sodium being added to the solution. To obtain large crystals the crystallizing vessels are surrounded by some non-conductor, usually wool, and thickly covered. In the English factories borax is made by fusing the crude boric acid with one half its weight of calcined soda on the hearth of a muffle furnace, under continual

stirring. The ammonia, existing in crude boric acid as sulphate, goes off in the form of carbonate, and is condensed in a suitable chamber. The fused mass is dissolved in hot water, clarified by allowing it to settle, and cooled slowly in an iron vessel. In France its manufacture has been united with that of fuming sulphuric acid; the boric acid and calcined Glauber's salt being distilled together, and borax obtained from the residue left in the retort.—Very recently borax has been obtained from the native borate of lime and soda (tiza or boronatrocalcite), which is found in Tarapaca in Peru, and on the W. coast of Africa. The mineral is ground and triturated, then covered with two thirds its own weight of commercial hydrochloric acid, and to this double its volume of water added, and digested at a boiling heat until entirely decomposed, the heat being increased toward the close and water added to preserve the original volume. It is allowed to settle, and decanted while hot. On cooling, nearly all the boric acid crystallizes out, leaving the chloride of sodium and chloride of calcium, together with a slight excess of hydrochloric acid, in the mother liquor. The boric acid thus obtained is allowed to drain, pressed or squeezed out, washed in cold water, and again dried, when it is so pure that on adding soda a pure borax is obtained on the first crystallization. In England the boronatrocalcite is fluxed with soda, but the process offers many difficulties. The use of stassfurtite to make borax has also been successfully tried in Germany. Prismatic borax forms almost colorless, transparent crystals, of a specific gravity 1.75, soluble in 12 parts cold water or 2 parts of boiling water; the solution is slightly alkaline. Exposed to the air, the crystals effloresce only on the surface; on being warmed they decrepitate, and swell up into a spongy mass known as calcined borax; at a red heat they fuse to a transparent glass (borax glass), which takes up water and loses its transparency very slowly.—Octahedral borax ($\text{Na}_2\text{B}_4\text{O}_7 + 5\text{H}_2\text{O}$) is prepared as follows: A boiling solution of prismatic borax is made of a specific gravity of $1.26=80^{\circ}$ B., and allowed to cool slowly and regularly. The octahedral crystals begin to form at 79° C., and continue to do so down to 56° , below which temperature the mother liquor produces only prismatic crystals, and hence must be removed. Buran obtained them from a solution of a specific gravity of 82° B., ten days being allowed for 10 cwt. to cool. The tincal from India and half-refined borax from China are sometimes octahedral. It differs from the ordinary borax in crystalline form, has a specific gravity of 1.81, is hard enough to scratch a prismatic crystal, and when exposed to moist air becomes opaque, takes up water, and goes back into the prismatic form.—The uses of borax are numerous. It has the property at a high temperature of dissolving metallic oxides, and forming transparent glasses, the color depending on the

metal used; thus cobalt oxide gives a blue glass, chromium oxide a green glass, and so on. On this property depends its use not only in analytical chemistry, where it serves to determine certain metals before the blowpipe, but also in soldering. Borax is largely used in making strass, enamels, and some kinds of glass, and in vitreous pigments for glass and porcelain; in glazing earthenware; as a flux to reduce certain metals from their ores; and in South America, under the name of *quemason*, the crude substance is actually used in smelting copper. With shellac (in the proportions 1 to 5) it forms a varnish soluble in water, used in stiffening felt hats. With caseine it makes an adhesive substance that may be used instead of gum arabic. Borax is used instead of soap for washing the gum out of silk, instead of sal soda in the laundry, to cleanse the hair, and as a cosmetic. In printing and dyeing establishments it has been proposed to use it to fix the mineral mordants. Aqueous borax has been proposed as an agent for the preservation of wood. In medicine it is employed for many diseases connected with the bladder and the uterus, and also as a wash for cutaneous eruptions, canker in the mouth, and ringworm. It has the property of making cream of tartar, when boiled together with it, very soluble in water, and this soluble cream of tartar is often found a convenient preparation when large doses of this medicine are required. It is also used to expel cockroaches from closets and pantries, these insects seeming to have an antipathy for it.

BORBECK, a town of Rhenish Prussia, on the Ruhr, 4 m. N. W. of Essen; pop. in 1871, 16,857. It has a castle, and is the seat of a flourishing iron industry; in the vicinity are several coal mines. The place is rapidly increasing in population.

BORDA, Jean Charles, a French mathematician, born at Dax, May 4, 1733, died in Paris, Feb. 20, 1799. He served as a young man both in the army and navy, and gave much study to the principles of projectiles and the construction of vessels. Chosen a member of the academy in 1756, he furnished to it several valuable contributions on these subjects. He was employed by the government in 1771 on expeditions to ascertain the value of chronometers in determining longitudes. He was sent on several geographical expeditions, and was one of the commissioners with Delambre and Méchain to determine the arc of a meridian as the basis of the metrical system of measures and weights. A new instrument for measuring the inclination of the magnetic needle was invented by him, and he made important improvements in the reflecting circle for the accurate measurement of angles. He rose to the rank of major general of marines, serving as such in the American war of independence. He wrote several works on mathematics and navigation, and constructed logarithmic tables for the centesimal division of the quadrant.

BORDE, Andrew, an English physician, born at Pevensey, Sussex, about 1500, died in London in April, 1549. He travelled in various parts of Europe and Africa, and finally settled down as a physician in England. It is said that he became fellow of the college of physicians in London, but he died insolvent in the Fleet prison. He wrote several works of a humorous character, and is said to have given rise to the phrase "merry Andrew," from his practice of making droll speeches at fairs and public gatherings, to attract the people.

BORDEAUX (anc. *Burdigala*), a city and seaport of France, capital of the department of Gironde, on the left bank of the river Garonne, 58 m. from its mouth, and 807 m. S. W. of Paris; pop. in 1866, 194,241. Long before the Christian era Burdigala was a commercial emporium, and the chief town of the Bituriges Vivisci, a Celtic nation of southern Gaul. In the 2d century Hadrian made it the metropolis of Aquitania Secunda. During the decline and after the fall of the Roman empire it suffered successively at the hands of the Goths, Vandals, Saracens, and Normans. It was annexed to the Frankish kingdom by Clovis, and reconquered from the Saracens by Charles Martel. On the final dissolution of the Carolingian empire it became the capital of the duchy of Aquitaine. Eleanor of Aquitaine united it to France by her marriage with Louis VII.; but after her divorce she married Henry Plantagenet, afterward king of England (1154), thus subjecting the duchy to the English crown. From that period until the middle of the 15th century Bordeaux remained in the possession of the English, and in the 14th century the Black Prince made it the seat of his court. The city was the last to submit to Charles VII. of France, in 1453. Since that time the city has been substantially rebuilt, and now is architecturally one of the finest in Europe. In the first revolution it was the headquarters of the Girondists, and suffered much during the reign of terror. Under Napoleon it was injured by the continental blockade, and toward the close of his reign became noted for its loyalty to Louis XVIII. In December, 1870, the delegation of the provisional government of France, consisting of Gambetta, Glais-Bizoin, and Crémieux, which during the first months of the siege of Paris had governed the provinces from Tours, established itself at Bordeaux; and on Feb. 12, 1871, the national assembly of the French republic met there, removing to Versailles in March.—Besides the palace or amphitheatre of Gallienus, very few remains of the Roman monuments are to be seen. Those of the middle ages have been better preserved; among these are the cathedral of St. André, an imposing though irregular Gothic edifice, consecrated in 1096 and completed in the 15th century; the church of St. Michel, built about the 12th century; the church of Ste. Croix, built before the middle of the 7th century, and restored by Charlemagne; the imperial college,



Bordeaux.

and other ancient buildings. The modern aspect is admirable. The broad curve of the Garonne is lined with crowded quays, adjacent to which are some of the most commodious warehouses in Europe. The bridge which connects the city with the suburb La Bastide was completed in 1821, at a cost of \$1,800,000; it is 1,590 ft. long, with 17 arches. Two of the old gates of the city still remain, la porte du Palais, formerly the entrance to the palace of the dukes of Aquitaine and the seneschals of England, and la porte de l'Hôtel de Ville, which is surmounted by three antique turrets. There are numerous open squares, broad avenues, and fine promenades. The place des Quinconces is the finest square in the city, and occupies the site of the ancient château Trompette. The public garden in the same neighborhood is elegantly laid out with conservatories, &c. Among the finest of the modern edifices of the city are the Grand theatre, erected in 1780, at a great expense, and presenting one of the handsomest exteriors in Europe; the bourse, in which the merchants congregate daily under a glass dome covering an inner court 95 ft. long by 65 broad; the palais de justice and the hôtel de ville, formerly the palace of the archbishop. There are several fine churches besides the mediæval ones already mentioned, among them St. Michel, which has a lofty detached tower and contains some fine works of art, and St. Seurin, remarkable for its finely carved porch and curious bass reliefs. There are also a gallery of paintings, a museum containing many historical relics, a museum of natural history, and a public library with 140,000 volumes. The imperial college, academy of arts, sciences, and belles-lettres, and the botanical garden with courses of study and lectures, are among the learned institutions; and there are numerous schools and

educational associations.—In commercial importance, wealth, and culture, Bordeaux is excelled by no French city except Paris. The harbor is commodious, and always crowded with shipping from America, Great Britain, and the Mediterranean ports, and the entrance and channel of the river have been greatly improved in recent years. Ship building is very extensively carried on, but the city is not distinguished for general manufactures. There



Grand Theatre.

are some iron foundries, cotton factories, and sugar refineries; and brandy, vinegar, cordage, gloves, and musical instruments are made. There is but one bank in the city, and that was transformed in 1848 into a branch of the bank of France. In 1864 1,488 vessels of 356,565 tons entered the port, of which 732 of 142,947 tons were French; and 1,455 vessels of 875,291 tons left it, of which 707 of 167,145 tons were French. The same year 1,644 French coasting

vessels of 129,762 tons entered, and 1,745 of 116,714 tons cleared. The red and white wines of the Gironde are exported almost altogether from Bordeaux. The average annual export from 1860 to 1865 was 13,861,976 gallons, of which 5,600,127 went to European ports, 1,822,362 to the United States, and the rest to other countries. The brandies exported from Bordeaux are produced mainly in the districts of Armagnac and Marmande. The principal distilleries are at Cognac, the best known being those of Martell and Hennessy. The average annual exportation from 1860 to 1864 was 1,598,211 gallons, of which 413,900 gallons went to European ports, 445,329 gallons to the United States, and the rest to other countries.

BORDEAUX, Duke of. See CHAMBORD.

BORDEAUX WINES. See FRANCE, WINES OF.

BORDELAIS, a district of S. W. France, in the ancient province of Guienne, now forming a part of the department of the Gironde. The inhabitants of Bordeaux and its neighborhood are called the Bordelais; and the same term is applied to the products of the district, of which wine and a breed of cattle resembling those of Holland are the principal.

BORDEN, Simon, an American engineer and mechanic, born at Fall River, Mass., Jan. 29, 1798, died there, Oct. 28, 1856. With very little instruction he mastered the principles of mathematics and mechanical science, and became a skilful engineer and one of the best mechanics of his day. In 1828 he took charge of a machine shop in Fall River, and in 1830 devised and constructed for the state of Massachusetts an apparatus for measuring the base line of the trigonometrical survey of that state, which at that time was the most accurate and convenient instrument of the kind extant. Mr. Borden assisted in the measurement of the base and in the subsequent triangulation. In 1834 he took charge of the work, and completed it in 1841. It was the first geodetic survey ever completed in this country, and its precision has since been proved by the coast survey. He afterward laid down the boundary lines between Massachusetts and Rhode Island, constructed several railroads, and published in 1851 a volume entitled "A System of Useful Formulæ, adapted to the Practical Operations of Locating and Constructing Railroads." In 1851 he accomplished a difficult feat by suspending a telegraph wire over a mile long, upon masts 220 ft. high, across the Hudson, from the Palisades to Fort Washington.

BORDENTOWN, a township and village of Burlington county, New Jersey, on the Camden and Amboy railroad, 6 m. S. E. of Trenton; pop. of the township in 1871, 6,041. The village lies pleasantly on an elevated plain on the left bank of the Delaware river, and contains several public and private schools. It is the terminus of the Delaware and Raritan canal, is connected by railroad with Trenton, and is a favorite place for excursions by steam-

boat from Philadelphia. The extensive car shops, locomotive works, and general depot of supplies of the Camden and Amboy railroad are situated here. The mansion built by Joseph Bonaparte is in the neighborhood.

BORDLEY, John Beale, an American agriculturist, born in 1728, died in Philadelphia, Jan. 25, 1804. He was a lawyer who devoted himself to husbandry, and cultivated an estate on Wye island in Chesapeake bay. He published many essays and short treatises on agricultural topics, and established at Philadelphia in 1793 the first agricultural society in the United States.

BORDONE, Paride, a painter of the Venetian school, born at Treviso about 1500, died in Venice about 1570. He was for a time a pupil of Titian, and afterward studied the works of Giorgione. His own style, though not an imitation, is formed in a measure on the characteristics of these two artists. He attained special celebrity for his portraits. Several of his pictures are to be found in the galleries of Venice, including his masterpiece, the "Old Gondolier presenting a Ring to the Doge."

BORE, the rapid rushing of the tide inland against the current of a river. This phenomenon takes place when a narrow river falls into a gradually widening estuary subject to high tides. At spring tides the great volume of water which enters the wide mouth of the estuary is compressed as it advances till it is several feet higher than the mouth of the river, up which it therefore rushes like a torrent. In England the bore is observed in the Severn and Trent rivers and in Solway frith. There is a remarkable bore in the Hoogly branch of the Ganges, where the current goes 70 m. in 4 hours; also at the mouth of the Brahmapootra, where no boat ventures to navigate at spring tide, and at the mouth of the Indus. The rise of the tide in the bay of Fundy resembles a bore, and this phenomenon occurs in some of the smaller rivers on the coast of Brazil, as well as in the Amazon on a large scale.



Boreas. (From a base relief on the Temple of the Winds, Athens.)

BOREAS, the Greek name of the north wind; in mythology, son of Astræus and Eos (Aurora).

and brother of Hesperus, Zephyrus, and Notus, dwelling in a cave of Mount Hæmus in Thrace. He carried off Orithyia, daughter of Erechtheus, by whom he begot Zetes, Calais, and Cleopatra, who are called Boreadæ. In the Persian war Boreas destroyed the ships of the invaders, and hence was worshipped at Athens, where a festival, Boreasmi, was instituted in his honor. He was represented with wings, which, as well as his hair and beard, were full of flakes of snow; instead of feet he had the tails of serpents, and with the train of his garment he stirred up clouds of dust.

BORECOLE, a variety of cabbage, known also as Brussels sprouts, and celebrated for tenderness and delicate flavor. Wild cabbage, or *brassica oleracea*, to which species borecole belongs, is met with in abundance in many parts of Europe. It is very common in the southern



Borecole.

part of Turkey, especially about Mount Athos. It is also found in Great Britain, on the coast of Kent, near Dover, on the Yorkshire coasts, in Cornwall and Wales, and on the Isle of Wight. In other places it forms a broad-leaved glaucous plant, with a somewhat woody stem, having but little likeness to its cultivated progeny.

BORELLI, Giovanni Alfonso, an Italian mathematician and physician, born at Castelnuovo, near Naples, Jan. 28, 1608, died in Rome, Dec. 31, 1679. He was professor of mathematics in Messina and in Pisa, became in Rome a favorite of Queen Christina of Sweden, taught mathematics (1677-'9) at the convent of St. Pantaleon, and was a member of the *accademia del Cimento*. He was one of the leaders of the *iatro-mathematical school*, and employed himself diligently in the dissection of animals with a view of explaining their functions upon mathematical principles. He invented a diving apparatus, excelled as an astronomer, wrote extensively on medicine, mathematics, and astronomy, and also published a scientific account of the eruption of Mt. Etna (1669). The first part of his principal work, *De Motu Animalium* (2 vols., Rome, 1680-'81), skilfully applies the principles of mechanics to the exposition of the movements of the body; but the second part is regarded as fallacious in respect to the application of mechanical principles to the ac-

tion of the heart, lungs, liver, and other viscera. This work was long regarded as a standard authority by the *iatro-mathematical school*.

BORGHERHOUT, a town of Belgium, in the province and 8 m. E. of Antwerp; pop. in 1866, 10,787. It is well built, and has bleaching and dyeing works, and manufactures of woollen goods and tobacco.

BORGET, Auguste, a French painter, born at Issoudun, Aug. 30, 1808. He studied under eminent masters, and in 1836 produced his first work, the "Banks of the Tiber." He made a journey round the world, and published illustrated albums of his travels, including *La Chine et les Chinois* (1842), and *Fragments d'un voyage autour du monde* (1845-'6). He also executed over 200 designs for *La Chine ouverte*, by Old-Nick (1845), and contributed to illustrated journals. He has painted many genre pictures and landscapes on Chinese, Hindoo, and other foreign subjects.

BORGHESE, the name of a patrician family of Siena, Tuscany, which came into prominence about the middle of the 15th century. Marco Antonio Borghese settled in Rome in the early part of the 16th century, and became an advocate of the papal court. His third son, Camillo, became Pope Paul V. in 1605, and did much for the advancement of his relatives. For Marco Antonio, a son of his elder brother, he procured the principedom of Sulmona and a grandeeship in Spain. His own brother Francesco he made commander of the troops which he sent against Venice in 1607. Scipione Caffarelli, a nephew, he created cardinal. Paolo, the son of Marco Antonio, married Olimpia Aldobrandini, the only child of the prince of Rossano, and grand-niece of Clement VIII., who brought the wealth of the Aldobrandini into the Borghese family. The son of Paolo, Giovanni Battista, was the ambassador of Philip V. to the court of Rome, where he died in 1717. His son, Marco Antonio, was viceroy of Naples in 1721, and another of the same name, descended from him, became a noted collector of works of art, with which he adorned his sumptuous villa near the Pincian hill.—**CAMILLO FILIPPO LUDOVICO**, son of the art collector, born in Rome, July 19, 1775, died at Florence, April 10, 1832. He joined the French on their invasion of Italy and went to Paris, where in 1803 he married Marie Pauline, sister of Napoleon and widow of Gen. Leclerc. (See **BONAPARTE**.) In 1804 he was made a prince of the empire and received the grand cross of the legion of honor. He served in the Austrian war of 1805, and at its close received the title of duke of Guastalla, the duchy itself being bestowed on his wife. He took part also in the campaign of 1806-'7 against the Prussians and Russians; but not long after, becoming jealous of his wife, he separated from her and retired to Florence. He was, nevertheless, after the peace of Tilsit in 1807, appointed by the emperor governor general of the provinces beyond the Alps, which included

the former states of Piedmont and Genoa. At the request of Napoleon he sold to the French nation, for the sum of 8,000,000 francs, over 800 of the works of art which ornamented the palace of his ancestors at Rome. After the abdication of the emperor he broke off all connection with the Bonapartes, and fixed his residence in Florence, where he lived in great splendor till his death. He was reconciled to his wife shortly before her death in 1825. Besides the famous villa near the Pincian hill, his family had large estates in Tuscany, Naples, and the papal territories.

BORGHESI, Bartolommeo, count, an Italian numismatist, born at Savignano, near Rimini, July 11, 1781, died at San Marino, April 10, 1860. His father was a man of considerable learning, and had made a large collection of coins, to which the son made valuable additions. He pursued the study of numismatics as a branch of historical research, published in 1820 the "New Fragments of the Consular Fasti of the Capitol" (*Nuovi frammenti dei Fasti consolari capitolini illustrati*), and intended to publish a *Corpus Universale Inscriptionum Latinarum*. This he never accomplished, but his correspondence and contributions to various Italian journals form an immense mass of material, and after his death Napoleon III. appointed a commission to collect and publish his complete works. In 1864 appeared vols. i. and ii. of *Œuvres numismatiques*, and vol. i. of *Œuvres épigraphiques*. Two additional volumes were published in 1872.

BORCHI-MANO, Adelaide, an Italian opera singer, born in Bologna, Aug. 9, 1830. She made her début at Bologna in December, 1846, and has since sung in the leading cities of Europe with great success. Her voice is a contralto of remarkable compass and power.

BORGI, Giovanni, the founder of ragged schools, born in Rome about 1736, died about 1802. He was a poor mechanic, but was in the habit of taking home the vagrant children of the streets, clothing them, and apprenticing them to various trades. His zeal interested others in the work, and he obtained means to rent a suitable building and to pay the expense of teaching and providing for a large number of poor children. The institution outlived Borgi, and was greatly extended, Pius VII. becoming its principal protector.

BORGIA. I. Cesare, an Italian prelate and soldier, born about 1457, died March 12, 1507. His family was of Spanish origin, but attained considerable prominence at Rome after the elevation of Alfonso Borgia to the papal throne in 1455 as Calixtus III. His father was Pope Alexander VI., and his mother a woman called Rosa Vanozza (Giulia Farnese). He was bishop of Pampeluna when a mere youth, and soon after his father's accession was made archbishop of Valencia, and in 1498 a cardinal. He began a war of extermination against the feudal barons and small princes in the Papal States and its vicinity, having persuaded his

father to take the lead in this movement. They dispossessed most of the feudatories, seizing their strongholds, castles, and estates. He is believed to have poisoned Zizim, the brother of Bajazet II., who sought refuge in Rome about this time. He also poisoned Giovanni Battista Ferrata, the richest and most influential dignitary in the papal court, and seized the treasures he had accumulated. Soon afterward he was suspected of procuring the murder of his own brother, Giovanni Borgia, duke of Gandia, who was found in the Tiber pierced with nine stiletto strokes by unknown hands. At all events he obtained his duchy and other possessions. In 1497 the pope released him from his clerical vows, and endeavored to make him marry Charlotte, daughter of Frederick of Aragon, king of Naples. This scheme, however, was unsuccessful, but a cardinal who participated in the intrigue was poisoned and his fortune seized by Borgia. Cesare was sent to France the next year with the bull divorcing Louis XII. from his wife Jeanne, and was rewarded by Louis with the dukedom of Valentinois and a command in the French army. While in the French service he obtained possession of Forlì, Cesena, Imola, Rimini, Piombino, the island of Elba, Faenza, and Camerino, and murdered their sovereigns. He married Charlotte, daughter of Jean d'Albret, king of Navarre, in 1499, and in 1501 he was made duke of Romagna and gonfaloniere of the holy see. He continued his onslaught on the petty sovereigns of central Italy, and aimed at making himself king of Romagna, Umbria, and the Marches; but Louis XII. arrested these ambitious machinations, and many whom Cesare had already deprived of their possessions recovered them. His most bloody military action was the storming of Sinigaglia, toward the close of 1502, at the head of his Swiss mercenaries, and the slaughter of his prisoners, including several princes, as described by Machiavelli. Finally, as many historians allege, in conjunction with his father, in August, 1508, he concocted the plan of poisoning four of the wealthiest cardinals at an evening party in the villa Corneto; but by mistake the poison, which was mixed in wine, was administered to Alexander VI. and to Cesare. The pope died about a week after. Cesare was saved, having taken but little of the drugged wine. He seized upon the papal treasures in the Vatican, and with about 12,000 mercenaries still kept Rome, although those whom he had despoiled in central Italy revolted and recovered their lost property. Finally his troops abandoned him, and the pope, Julius II., arrested and expelled him from the Papal States. He took refuge with Gonsalvo de Cordova, the commander of Naples, who sent him to Spain, where he was imprisoned by Ferdinand of Aragon. After two years he escaped and found an asylum, in 1506, at the court of Jean d'Albret, his father-in-law. Finally he was slain before the castle of Viana, while in the

service of the king of Navarre. He was highly educated, eloquent, and a patron of art and literature. For this reason he found many apologists, among them Machiavelli, who took him as the model ruler in his *Principe*. **II. Lucrezia**, sister of the preceding, died in 1528. She was equally remarkable for beauty and accomplishments, and was in her youth affianced to a nobleman of Aragon, but her father on becoming pope married her to Giovanni Sforza, lord of Pesaro. This union was dissolved in 1497, and she was given in marriage to Alfonso, duke of Bisceglia, natural son of Alfonso II., king of Naples, and made duchess of Spoleto and Sermoneta. The duke was assassinated two years later, as was believed by order of her brother Cesare. In 1501 she married Alfonso d'Este, son of the duke of Ferrara, became a patron of men of letters, and attracted a brilliant society to her court. In her later years she was much given to devotion and acts of charity. She has been often represented as a monster of profligacy, sharing in the atrocities of her father and brother, and even living with them at Rome in incestuous intercourse; but she has also found many defenders, who deny the crimes alleged against her.

BORGIA, St. Francis, general of the society of Jesus, born at Gandia, Spain, in 1510, died in Rome, Oct. 1, 1572. He was duke of Gandia, grand equerry to Isabella of Portugal, the consort of Charles V., and *mayor domo* to the crown prince, afterward Philip II. He was always exact in his religious duties, and after the death of his wife gave up his title and estate to his son and entered the society of Jesus, retaining the administration of the duchy, by special permission of the pope, until his children were provided for. He was ordained priest in the 40th year of his age, and devoted himself to extending and strengthening the order of Jesuits in Spain. At the death of Laynez in 1565 he was elected general of the society, and remained in office till his death. Several bishoprics and the dignity of cardinal were repeatedly pressed upon him, but refused. He was canonized by Clement X. in 1671.

BORGIA, Stefano, an Italian cardinal and statesman, born at Velletri, Dec. 8, 1781, died in Lyons, Nov. 28, 1804. He was a generous patron of science, and made valuable collections of manuscripts, coins, and various antiquities. Having been made a member of the Etruscan academy of Cortona in 1750, he founded the celebrated museum of antiquities at Velletri. He was for some years governor of the duchy of Benevento, and by his sagacity preserved that province from the famine which ravaged the kingdom of Naples in 1764. In 1770 he became secretary of the propaganda, and during 18 years that he occupied that office was enabled greatly to enrich his collection of rare manuscripts and antiquities through the missionaries. Pius VI. named him a cardinal in 1789, and put under his care the institution of foundlings, and in 1797, when the

revolutionary movement reached Rome, made him dictator of the city. Expelled by the Roman republicans, he retired to Venice, and afterward to Pisa, where he formed a small society of scientific men. He returned to Rome with Pius VII. in 1800, and devoted himself to reorganizing the papal government. He died while on a journey to Paris as companion of the pope. Besides his valuable collections, he left several historical works of some merit.

BORGNE, Lake, a body of water in the S. E. part of Louisiana. It is strictly the termination of that large arm of the Mexican gulf known as Mississippi sound, being connected with it by a strait crossed by a line of small islands, and faced on the east by Grand island. It is also connected with Lake Pontchartrain by the Rigolet pass. It has about the average depth of Lake Pontchartrain, and approaches within 15 m. of New Orleans. Its greatest extent from N. E. to S. W. is about 27 m. Lake Borgne forms a part of the eastern boundary of the Mississippi delta.

BORGO, Pozzo di. See Pozzo di Borgo.

BORGOGNONE, Jacopo Cortesi, also known as Jacques Courtois (his original name), an Italian painter, born in Burgundy in 1621, died in Rome, Nov. 14, 1676. He studied his art at Bologna, a part of the time under the instruction of Guido. He worked very rapidly, and excelled in representing battle scenes. For many years he resided at Florence, where he acquired a fortune by his pencil, and about 1656 became a Jesuit, still devoting himself to art, but working chiefly on religious subjects.

BORGOMANERO, a walled town of Piedmont, Italy, in the province and 20 m. N. N. W. of the city of Novara, beautifully situated near the Agogna and on the road to Lakes Orta and Maggiore; pop. about 7,000. The town contains several churches, convents, and other public buildings, and manufactories of silk and several other articles.

BORGOO. I. A kingdom in the interior of Africa, bounded N. by Goorma, E. by the Niger, S. by Yoruba, and W. by Dagomba. It is generally a level country, though crossed by a range of mountains. The soil is fertile and well cultivated, and produces corn, yams, plantains, and limes. Game is found in abundance. The people are good-natured, and tolerably honest and thrifty. Borgoo is divided into the states of Boossa, Wawa, Kiama, and others, and is crossed by a caravan route over which there is considerable traffic. Boossa, which holds the first rank among the states, was the scene of the murder of Mungo Park. **II.** Another kingdom in the interior of Africa, about 400 m. N. E. of Lake Tchad. It is a mountainous region, and is said to be fertile and healthy. It has never been explored by Europeans. An unsuccessful attempt was made to reach it by Barth and Overweg in 1851.

BORIC ACID, a compound of the element boron with oxygen and hydrogen; also called boracic acid. It occurs in nature under the

name of sassoline, H_2BO_3 , composed of boric anhydride, B_2O_3 , 56.45 per cent., and water 43.55. It is also contained in the following minerals, in the proportions given: boracite (magnesium chloride and borate), 62.5 per cent.; rhodocite (calcium borate), 30 to 45; tiza or boronatrocalcite, 30 to 44; hydroboracite, 47; borax or tincal, 36.58; datholite (boro-silicate), 18; botryolite (do.), 20.35; axinite (do.), 2 to 6.6; tourmaline, schorl (do.), 2 to 11.8; larderellite (ammonium borate), 68; lagonite (iron borate), 49; also in many mineral waters and the ocean. Boric acid is the hydrate of boric oxide, also called boric anhydride, B_2O_3 . It was discovered in 1702 by Homberg, who called it sedative salt. The crystals are white, pearly, and scaly, unctuous to the touch, and exposed to a temperature of $212^\circ F.$ lose half their water of crystallization, and at a higher temperature the whole. The mass fuses into a hard transparent glass, but will not sublime except at a white heat. Unless protected from the air it absorbs water and loses transparency. Deprived of water, its specific gravity is 1.8; that of the hydrate is 1.48. Boiling water dissolves one third of its weight of the crystals; cold water only about one thirtieth. They are soluble in alcohol, and when this is ignited the acid gives to the flame a beautiful green color. This is employed as a characteristic test of its presence. The acid properties of this substance at ordinary temperatures are very feeble. It scarcely reddens vegetable blues, and turmeric paper is rendered brown by it as by an alkali. It is expelled from its combinations by stronger acids almost as readily as carbonic acid is. But at high temperatures, as when exposed to a red heat in a crucible, boric acid mixed with sulphate of soda expels the sulphuric acid, and combines with the soda; when cold, the process may be reversed.—In boiling the aqueous solution, the acid is taken up by the steam; much more, however, is this the case with the alcoholic solution. It is to this property we owe the supplies of boric acid, which are furnished from the interior of the earth by jets of steam that issue through fissures, and come up more or less laden with this material, as well as other substances, as sulphur, sal ammoniac, clay, and gypsum. The acid is deposited in the soil in the form of solid efflorescences, or is collected in pools of water, through which the jets are made to pass. In South America it is collected upon the surface of the ground. At an island of the Lipari group, called Vulcano, 12 m. N. of Sicily, it rises in vapor at the bottom of the crater of an extinct volcano, 700 ft. below its summit. The vapor condenses here upon the bottom and sides, like frost after a heavy dew; but it goes on accumulating, till it resembles more a bed of clean snow; beneath it is found a layer of red-hot sal ammoniac, through which come up sulphurous vapors. The boric acid is gathered up as it collects, and with the sulphur and sal am-

moniac is a source of no little profit to the proprietors of the volcano. It is also found at Sasso in S. Italy, and has hence been called sassoline. But the great supplies of it are obtained from the volcanic districts of Tuscany. Here, over an area of some 30 m. of wild mountain land, issue through beds of calcareous rocks, black marl, and sand, numerous jets of steam, which rise in white clouds among the hills, and spread around offensive sulphurous smells and vapors, that drench those passing by the spot. The ground itself is hot and undermined. It shakes beneath the feet, and is sometimes so treacherous as to let man or beast walking upon it fall through into its heated recesses. Its surface is covered with incrustations of sulphur and saline substances. The waters beneath are heard boiling with strange noises, and are seen to break out upon the surface. Of old it was regarded as the entrance to hell. The name Monte Cerboli (*mons Cerboli*) is still retained by a neighboring volcano, and contains the principal lagoon or pool from which the acid is obtained. The great value of these natural exhalations, or *soffioni*, as they are called, was discovered in 1818, and made available by the skill and ingenuity of Count Larderel. Wherever up the slopes of the hills the ground is observed to be hotter than usual, and sulphurous vapors are seen to rise from it, and the surface is felt to tremble, a pit is dug, from which soon issues a column of steam. A temporary wooden chimney is put up for this to pass through, so that the workmen may continue the excavation, and construct a basin with stone wall lining, to contain the water intended to receive and collect the acid brought up by the steam. The water is introduced from some supply at the surface, and the chimney is then removed. The heat soon causes the water to reach nearly the boiling point. It penetrates into the fissure, and is rejected by the steam, bringing up with it a portion of boric acid. As it is found that the quantity which the water is capable of absorbing is very small, fresh supplies are introduced every day; and the pits are so arranged down the slope of the hill that the water entering at the top passes from an upper basin into a lower one, and so on, till at the foot it is received into large evaporating pans. The basins or "lagoons" are of rough shapes, rudely constructed, from 5 to 8 ft. deep, and from 18 to 60 ft. in diameter; they continue to receive the vapors for years, but the jets are liable at any time to cease and break out in a new place. The pans are very numerous, and present a great evaporating surface. They are heated by the vapors of some of the *soffioni*, which are conveyed under them in flues. After the liquor has passed through a series of the pans and been greatly concentrated, it is baled out and drained through baskets, and the precipitated salt is taken to the drying rooms. These are of brick and warmed in the same manner as the pans are heated. Thus the operations are

carried on with no expense of fuel, and boric acid is obtained to the amount of 5,000,000 Tuscan pounds or more per annum. Since 1854 artificial soffioni have been produced by boring, and the yield from this source is very large. The product is of late years more impure than formerly, the foreign matters having increased from 8 per cent. to 25 per cent., which appears to have excited some apprehension lest the supply may give out. An analysis of the crude acid made by Vohl in 1866 is interesting, as showing the great variety of the associated substances. It is as follows:

Boric acid crystallized.....	80.000
Hygroscopic water.....	4.500
Sulphuric acid.....	9.610
Sillicic acid.....	0.810
Sand.....	0.800
Oxide of iron.....	0.120
Oxide of manganese.....	0.001
Alumina.....	0.570
Lime.....	0.010
Magnesia.....	0.000
Potash.....	0.180
Ammonia.....	9.980
Soda.....	0.002
Chloride of sodium.....	0.100
Organic matter and loss.....	0.217

100.000

Our knowledge of the Tuscan locality, and the process as there conducted, is derived from the treatise of Payen, who describes it in detail. Sir John Bowring and Durval have also furnished interesting data concerning it. Boric acid is of value principally for the preparation from it of borax. It is used in manufacturing a paste for artificial gems, and in making enamel. Its price in Tuscany is about 10 cents a pound.

BORIE, *Pierre Rose Ursule Dameoulin*, a French missionary, born at Beynat, Feb. 20, 1808, put to death in Tonquin, Nov. 24, 1838. After completing his studies for the priesthood, he sailed for Tonquin, Dec. 1, 1831, arriving just at the commencement of a bloody persecution of the Christian converts. He very soon learned to speak the language and accommodate himself to the habits and temper of the Tonquinese, and labored with great zeal and success for six years. In 1838 he was apprehended, severely beaten, and imprisoned, and after four months condemned to be beheaded. He bore his tortures with fortitude, and such was the veneration of the people for his character that no one was willing to deal the fatal blow. The soldier selected for that purpose intoxicated himself, and performed the task so awkwardly that seven strokes were necessary for its completion. After his death the heathens burned gold paper over his grave and honored him as a divinity.

BORING, a name common to two distinct mechanical operations, which bear different appellations in most languages. The one consists in turning the inside surface of cylinders to make them true, the other in cutting holes through solid matter. Cylinders of a diameter smaller than four feet are bored on a lathe; the cylinder is fastened to the slide-rest, and the tool is keyed on a mandrel or boring bar held between the centres of the lathe; the cylinder

moves lengthwise, and the tool revolves so that the cut is helical. Large cylinders of the thickness usual for steam engines are bored on a vertical machine, as their weight is sufficient to deflect them when resting on the side. This important tool is of modern invention, and is found only in those large establishments where huge steam engines are built. A boring machine is generally placed in a corner of the shop formed by two solid walls. It consists mainly of a vertical shaft placed below the floors, supporting a vertical boring bar which carries a horizontal cutter wheel, and of a strongly ribbed bed plate on which are four movable standards or supports, with clamps to hold the cylinder in a vertical position. The lower end of the shaft rests in a socket on strong foundations; the upper end is keyed loosely to the boring bar, and supports it. The boring bar is guided by two adjustable boxes, the lower one forming a part of the bed plate, the upper one part of an iron beam strongly bolted and braced to the walls. The shaft and boring bar are made to revolve by a train of wheels placed under the floor. The cutter wheel, on which are bolted several tool-carriers, descends slowly along the boring bar. To operate with this machine, the boring bar is at first withdrawn, to make room for the cylinder, which is placed on the standards, and then the bar is put back in its place inside the cylinder. This last is then so adjusted as to have the same axis with the boring bar, and is firmly clamped. Cutting chisels are set on the tool-carriers; these are adjusted for the depth of cut desired, and the ma-

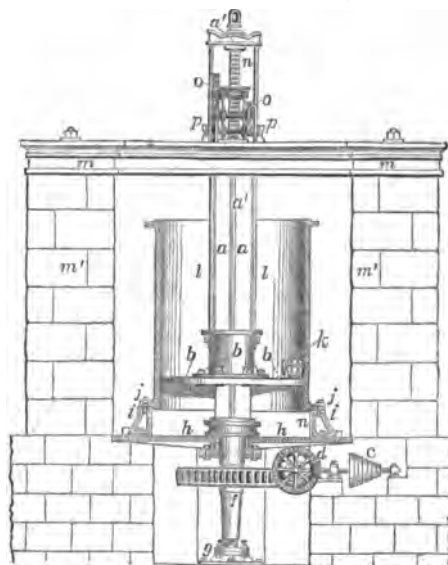


FIG. 1.—Boring Machine.

chine is put in motion. After the cutter wheel has come down the whole length of the cylinder, it is raised by means of a revolving crane

for another cut. Boring machines were made to avoid the bulging of the sides of cylinders when placed horizontally, as this was the main impediment to good boring; they also avoid the deflection of the boring bar. They require much less power than lathes to do the same work, and have several other minor advantages. Messrs. Nasmyth, Gaskell and company constructed the boring mill represented in fig. 1 for the purpose of boring the large cylinders, 10 ft. in diameter, for the Great Western steamship navigation company's vessel the *Mammoth*, at their works at Bristol. The motion is communicated by the driving pulley *c* to a bevel pinion working the bevel wheel *d*. The shaft on which this wheel is fixed has on its opposite end a worm for communicating motion to the upright shaft *f* and boring bar *a*. This boring bar has vertical grooves *a'*, in which the cutter head *b* is movable, sliding up and down according to the progress of the work; *k* is a tool-carrier, fixed to the cutter head, by which the boring is effected. The foundation plate *h* forms a bearing for the upright shaft, the lower end of which rests in the step *g*, while the cylinder *l* is secured by the clamps *j j* to the supports *i i*, which are fixed to the foundation plate. Two strong pieces of masonry, *m'*, support the entablature *m*, for carrying the self-acting apparatus for raising and lowering the cutter head *b*. The entablature is secured to the masonry by strong holding down bolts. This self-acting apparatus consists of a rack, *n*, worked by a pinion, the motion being transmitted by trunnion wheels through two spur wheels and pinions, *o o*. The whole of this upper machinery revolves with the boring bar, with the exception of the ring *p*, upon which the trunnion wheels rest and revolve. The motion thus produced is communicated to the rack, which is either raised or lowered according to the direction in which the boring bar revolves. Smaller hollow cylinders are bored in a similar manner, except that they are usually placed in a horizontal position. The cutter head may be made to revolve in the cylinder, or the cylinder may revolve about the cutter head. The barrels of muskets and other small firearms, being forged hollow, are bored upon a similar principle. The barrel is screwed on a carriage which moves in iron grooves, and is propelled toward the boring bar by a rope which passes over pulleys and has a weight hanging from the end. (For the boring of cannon and rifle guns, see CANNON, and RIFLE.)—In the boring of solid substances various questions require to be taken into consideration. If the tools had only to cut away a portion of matter, as is done in cutting, planing, and turning, the directions given for cutting tools as to the angles of the faces of the edge with the work, the velocity, and the lubricating liquid proper for the substance to be cut, would have to be strictly applied. Such is not the case, however; a drill has not only to turn off the bottom of the hole,

but also to pare its sides, to guide itself in a straight line, and, for wood and some other substances, to eject the shavings. Moreover, the velocity is unavoidably different at all points from the centre to the circumference. In consequence, the rules given for cutting tools are observed in boring tools only as far as they accord with other important requisites; but they must never be lost sight of. Drills are made, in general, to bore straight holes, by providing them with a centre point or pin projecting beyond the cutting edge just in the centre of the hole, or by tapering the cutting edges to a point. They are made to bore clean holes, by providing them with a shearing point on the side, that cuts like the point of a knife;

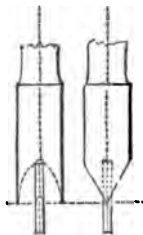


FIG. 2.



FIG. 3.

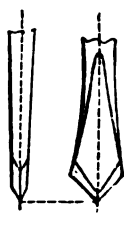


FIG. 4.

or by prolonging the cutting edge along the side; or, for metal, by making a reamer with the stem of the drill (figs. 2, 3, and 4). Boring tools are made to eject the material cut away, by shaping the stem in the form of a screw, or by making it hollow. The various tools used for boring wood are as follows: The brad awl (fig. 5) is a cylindrical wire, with a chisel edge; it packs the material around the hole. The awl



FIG. 5.



FIG. 6.



FIG. 7.



FIG. 8.



FIG. 9.



FIG. 10.

(fig. 6) is a square bar tapering to a point. A great number of tools are fluted, that is, have the shape of the half of a tube. Such are the gouge bit (fig. 7), the spoon bit (fig. 8) and its varieties, the table bit and the cooper's dowel bit, and the nose bit or auger bit (fig. 9). The gimlet (fig. 10) is fluted, but terminates in a screw, which drives it into the wood. The centre bit (fig. 11), an instrument of English invention, consists of a centre point, a shearing point, and a broad inclined cutter. Its varia-

tions are called plug centre bit, wine cooper's centre bit, and expanding centre bit. The tools in the form of a screw are the single-lip auger (fig. 12), made of a half-round bar wound

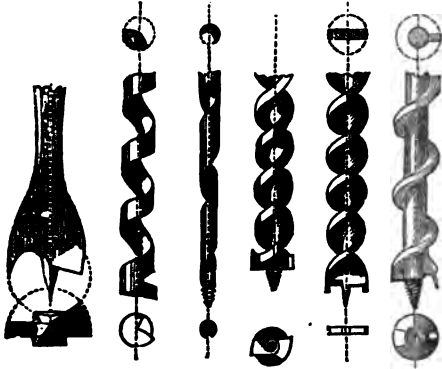


FIG. 11. FIG. 12. FIG. 13. FIG. 14. FIG. 15. FIG. 16.

spirally around a cylinder; the twisted gimlet, (fig. 13), made of a conical shaft, around which is cut a half-round spiral groove; the screw auger (figs. 14 and 15), formed of a flat band of steel twisted when red hot; the American auger (fig. 16), made of a solid shaft, around which is a thin helical fin. The last much resembles a wool screw; the cutting edge is removable, and resembles that of a centre bit. All these twisted tools are of American invention, and were scarcely known in Europe 30 years ago. Another American tool is an auger for producing square holes or cutting mortices: it consists of a screw auger working in a tube, round inside and square outside; the four corners at the lower end of the tube are sharpened from inside, and proceed forward a short distance behind the cutting edge of the auger, cutting through the wood as they advance, and making the round hole square. Several

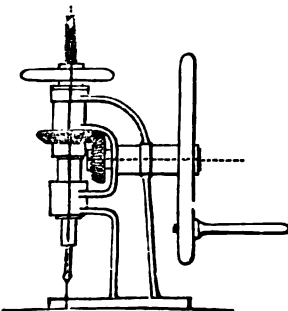


FIG. 17.—Drilling Machine.

of these tools working side by side will cut an oblong hole. Boring tools for wood are worked by means either of a lathe, a carpenter's brace, a transverse handle, or a drilling machine. (See fig. 17.)—Boring tools for metal are called

drills, and are much less varied in shape than those for wood. The double-cutting drill, fig. 4, is made by flattening the end of a small bar of steel, cutting it so as to form a point or projecting angle of about 90° in the centre line of the tool, and grinding on both sides to transform the two flats, forming the angle into edges of about 60° sharpness. Another double-cutting drill, called the Swiss drill, is made of a wire filed on one side to the diameter, the end of the remaining half being ground in the shape of a half cone. The common single-cutting drill, fig. 8, is forged flat and cut pointed, so as to show at the end two small faces meeting at an angle of 90° , and forming a point projecting in the centre line of the tool. These two faces are ground so as to form angles of 60° with the flat sides of the tool; the one face forming this angle with one side, the second face with the other. This drill is in universal use, the angles specified being slightly modified according to the nature of the metal to be bored. It is very difficult to drill a hole in the exact place where it is designed to be, and the error is proportional to the size of the drill. For this reason, when exactness is required for a large hole, a small hole is drilled first, and this is enlarged by means of a pin drill. The shape of a pin drill is exactly represented by placing two carpenter's chisels side by side, the one presenting its face, the other its back, to the person holding them, and by letting the end of a wire project between them a little below the edges. In using the instrument, the centre pin must enter and fit the small hole previously bored, which acts as a guide. If the portion of the cutting edges nearest the centre pin is cut away, the tool will cut a circular groove; such is the form adopted for cutting holes in the tube plates which receive the tubes in locomotives. These drills are worked in various kinds of braces, in the lathe or in the drilling machine. After they are drilled, the holes of all carefully made machines, which are not tapped, are perfected by reaming. A large proportion of holes drilled are intended for screws, and are consequently tapped. Taps, master-taps, stocks, dies, and reamers are costly tools; hence it is the interest of machinists to devise and adopt a uniform system in drilling and making screws, so that a machine may be repaired in another shop than that of the maker, without the necessity of making a new set of tools for each particular case. Hard steel and glass are bored with the end of a rotating brass rod fed with oil and emery. Glass offers also this remarkable and little known peculiarity, that it is drilled through as easily as hard woods with a common metal drill, provided the drill is kept all the time moistened with turpentine.—In boring rocks for blasting, the common hand drill and the jumper are more used than any other tools. (See BLASTING.) The situation of the place in which the holes are to be drilled is often very difficult of access with a machine, so that the time and expense employed in adjusting the apparatus would make it preferable to employ manual labor. When, however, large holes are desirable for the displacing of masses of rock, machines worked by compressed air furnished by steam power, when they can be placed in working position, are to be pre-

ferred; and, in fact, in all modern blasting on a large scale, the greatest amount of displacement of rock is effected by blasts which are made in the holes drilled by machines.



FIG. 18.—Air Compressor.

Among the most noted of the rock drills, having been the longest in use, and the principal one employed in excavating the Hoosac tunnel, is the Burleigh drill, a general outline of which and its mode of working are represented under **BLASTING**. It is what is called a percussion drill, that is, a drill whose bit is driven by blows against the rock, and is usually propelled, as are the other drills to be noticed, by compressed air, which is furnished by a double-cylinder pump, called the air compressor, fig. 18. The backward and forward motion of the piston rod to which the drill is attached is produced in the same manner as in an ordinary high-pressure steam engine. The Ingersoll drill is especially effective in excavating open cuts. In the engraving, fig. 19, *c* is the cylinder, *s* the steam or compressed air chest, *h* the pipe which supplies the compressed air, and *p* the screw for moving the drill forward, which may be done by the hand or by the rod *g*, which is

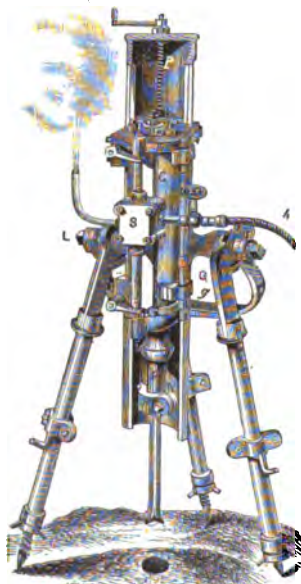


FIG. 19.—Ingersoll Drill.

turned by an automatic ratchet movement. Various attachments are used for the purpose of rotating percussion drills as well as for feeding them, a general idea of which may be gathered from the following description of a

drill (fig. 20) invented by Prof. De Volson Wood of the Stevens institute at Hoboken, N. J. The piston, piston rod, drill holder, ratchet for rotation, and enlargement for regulating the feed, constitute a single piece of cast steel. The small valve *a* is operated by the reciprocating movement of the plug *b*. Steam is admitted behind the plug *b* so as to keep it constantly pressed against the plug *c*, which rests upon the conical surface *d*. During the backward movement of the piston the small valve is forced upward by the conical surface, and during the forward movement it is moved downward by the pressure of the steam behind

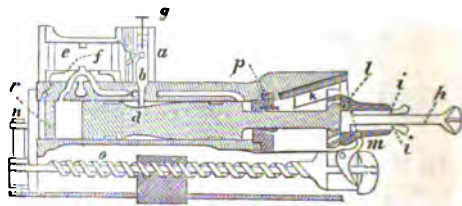


FIG. 20.—Wood's Drill.

the plug *b*. This small valve admits the motor so as to reciprocate the piston *e*, and this piston operates the main valve *f*. The length of the stroke is adjusted by simply turning the piece *g*. By this arrangement the valve is operated without shock, and hence will not break, and when properly set the main valve will not be opened until the blow is struck. The drill is seized and held automatically by the conical wedges *i*, and is rotated by the sloping click *k*, which rotates about its back edge, coming in contact with sloping teeth *l* on the enlargement of the piston rod. The click *m* prevents it from feeding forward, and the click *n* in a similar manner prevents it from feeding back. The thread on the screw *o* is made very steep, so that when the piston advances so far as to drive *m* out of bearing, the pressure of the motor on the forward head, *p*, during the backward stroke of the piston, forces the cylinder forward, which will cause the screw *o* to turn, thus securing an advance feed. A false head, *r*, to prevent the piston from striking the rear head, has the motor admitted and retained behind it by a puppet valve.—The diamond drill, owned by the American diamond drill company, the bit of which is the invention of Rodolphe Leschot of Paris, is a rotary machine, and of course differs widely in construction from those just described. There are several patterns and sizes; that represented in fig. 21 is a small tunnelling drill. It is so adjusted that it can be placed in any required position, moving as if on a universal joint. The bits, which are screwed on the end of the drill rod, are armed with black diamonds as represented in figs. 22 and 23. It will be observed that the diamonds are so arranged as to cut the hole larger than the diameter of the bit or the drill. Both the drill rod and the bit are hollow to admit water, which

is forced down to the bottom of the hole while the machine is at work. This drill is now (February, 1873) in use by the United States

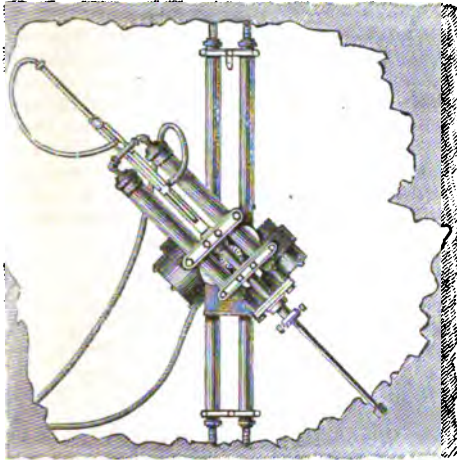


FIG. 21.—Diamond Drill.

government in deepening the channel of the James river below Richmond, Va. It is much used in prospecting for coal and other mine-

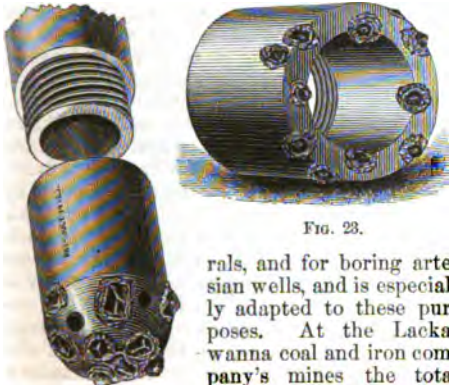


FIG. 22.

FIG. 23.

erals, and for boring artesian wells, and is especially adapted to these purposes. At the Lackawanna coal and iron company's mines the total boring in 67 days in the year 1872 was 6,357 ft.,

with an average number of $2\frac{3}{10}$ drills, the average of each drill per day being 34 ft. The average cost of the diamonds was $18\frac{1}{2}$ cents per foot.

BORISOGLEBSK, a town of Russia, in the government and 90 m. S. by E. of Tambov, on the Vorona, a tributary of the Don; pop. in 1867, 12,254. It has an important fair, manufactures of various kinds, and a large establishment for the melting of tallow.

BORISOV, a town of Russia, on the Beresina, in the government and 44 m. N. E. of Minsk; pop. in 1867, 5,233. Near the adjacent village of Studienka the Beresina was crossed by the French army, Nov. 26 and 27, 1812. (See BERESINA.)

BÖRJESSON, Johan, a Swedish dramatist, born at Tanum, March 22, 1790, died in Upsal, May

5, 1866. He was minister of the church of Weckholm near Enköping from 1828 till his death. His first and best drama, *Erik XIV.* (1846; German translation, 1855), was succeeded by many tragedies. In 1861 he became one of the 18 members of the Swedish academy.

BORLACE, Edmund, an English historian, a physician by profession, died at Chester about 1682. His father, Sir John Borlace, was one of the lords justices of Ireland, and he was educated at Dublin and Leyden. He practised his profession at Chester, and wrote among other works "The Reduction of Ireland to the Crown of England, with the Governors since the Conquest by Henry II. in 1172" (London, 1675), and "The History of the execrable Irish Rebellion, traced from many preceding acts to the grand Eruption, Oct. 23, 1641, and thence pursued to the Act of Settlement, 1661" (London, 1680).

BORN, Bertrand de, viscount of Hautefort, a French troubadour and warrior, born in the castle of Born, Périgord, in the middle of the 12th century, died about 1209. He belonged to an ancient family which traced its origin to the duke of Aquitaine, and early contended with his brother for the supremacy over the vast family domain, which contained 1,000 serfs. Richard Cœur de Lion took the dispossessed brother's part in revenge for Bertrand's satirical lays, upon which the latter espoused the cause of Henry II. and took a prominent and mischievous part in these family broils and wars, especially as Aquitaine was threatened both by France and England. After the death of Richard, whom he as well as other princes had instigated to go to the Holy Land without himself contributing anything to the crusades excepting spirited songs, he lived in retirement, as was believed in a monastery, and the fief of Hautefort was transferred in 1210 by his son Bertrand (who also wrote several songs) to the king of France. Eleanor of Aquitaine, wife of Henry II., was said to have been one of his patronesses; he was also in love with Helena, sister of Richard, though he celebrated Maenz, daughter of the viscount of Turenne, and wife of Talleyrand of Périgord, as the special object of his adoration. Dante places him in his inferno for leading the youthful king to quarrel with his father; and Thierry as well as Sismondi refers to the influence of his lyrics and of his sword and counsels in stimulating and embittering the spirit of contention of his day.—See Laurens, *Le Tyrtée du Moyen Age, ou histoire de Bertrand de Born, vicomte d'Hautefort* (Paris, 1868).

BORNA, a town of Germany, in the kingdom of Saxony, on the Wyhra, 16 m. S. S. E. of Leipsic; pop. in 1871, 5,751. It has an old Gothic church, and the ruins of an ancient castle, which was destroyed by the Hussites in 1430. The town has a considerable industry.

BÖRNE, Ludwig, a German author, of Jewish origin, born at Frankfort-on-the-Main, May 18, 1786, died in Paris, Feb. 13, 1837. His

father, Jakob Baruch, was a banker, and his grandfather was employed on a diplomatic mission to Vienna. He studied medicine, philosophy, and political science at Berlin, Halle, Heidelberg, and Giessen, and then entered the public service at Frankfort. When that city was restored to the condition of a free town he turned his attention to literature, and established two journals, the *Staats-Ristretto* and the *Zeitschwingen*, at Offenbach, near Frankfort. These were suppressed on account of their boldness in dealing with public affairs, and the editor was arraigned for circulating seditious pamphlets. He was acquitted, and in 1818, having in the mean time become a convert to Christianity and changed his name, he established a paper called *Die Wage*, which became famous by theatrical criticisms. He was a severe and caustic critic of the existing order of things, and lived much in isolation at Frankfort, Hamburg, and Paris. After the revolution of 1830 he established *La Balance* in Paris, with a view to creating a closer intellectual and social union between France and Germany. His *Denkrede auf Jean Paul*, remarkable for great elevation of thought, and his *Menzel der Franzosenfresser*, a fierce satire, are his best productions. Most of his writings are included in his *Gesammelte Schriften* (17 vols., 1829-'47) and *Nachgelassene Schriften* (6 vols., Mannheim, 1847-'50).

BORNEO, an island of the East Indian or Malay archipelago, situated directly under the equator, which divides it into two nearly equal parts. It is the largest island in the world with the exception of Australia, and possibly of Papua or New Guinea. Its native name is Pulokalamantin. It extends from about the 7th parallel of N. latitude southward a little further than lat. 4° S., and from its most western point, near the 109th meridian of E. longitude, eastward to Kaniungan point in lon. 119° 20' E.; its greatest length, which is from N. N. E. to S. S. W., is about 850 m., and its greatest width about 680 m. It is bounded N. and W. by the China sea, E. by the Sooloo sea, the Celebes sea, and Macassar strait, which separates it from the island of Celebes, and S. by the Java sea. Its estimated area is from 284,000 to 800,000 sq. m. The northern portion of Borneo is a peninsula with an average width of 120 m., trending from lat. 2° 30' upward of 300 m. in a northeasterly direction. The population is variously estimated at from 2,500,000 to 3,000,000.—Borneo has about 2,000 m. of sea-coast, in which there are comparatively few important bays or indentations, and no great inlets, but many rivers and small creeks. Along the entire S. coast the shores are low and generally marshy; the features of the E. coast up to Kaniungan Point, and of the W. coast up to Cape Datu, nearly opposite, are similar. The shores of the peninsula, however, are bolder, being rocky and lined with islets perilous to navigation. They enclose several bays of considerable extent, of which the more important are:

Maludu bay, which is sheltered by Cape Sampanmanjo, the N. extremity of the island, and was formerly a favorite resort of pirates; and Labok bay and Gyong bay, on the E. side of the peninsula, with the Unsang promontory between them, where edible birds' nests are gathered in large quantities for the Chinese market. Off the W. coast of the peninsula, in lat. 5° 22' N., lies the little island of Labuan, the seat of a small but important British colony.—An inland range extending from S. W. to N. E., with an average elevation of from 3,000 to 4,000 ft., forms the watershed of the great northern peninsula. At its extremities it curves outward toward the sea, and terminates in Cape Datu and Cape Sampanmanjo respectively. Its name changes, in proceeding northward, from the Krimbang mountains, which form the inland boundary of the territory of Sarawak, in the northwest, to the Batang-Lupar, and finally to the Madi mountains, whence the region comprised in the kingdom of Borneo proper slopes down to the Chinese sea. The chain attains its greatest height in Mt. Kina-Balu, the loftiest peak yet discovered in Borneo, 13,698 ft. above the level of the sea. It is near the northernmost end of the island, and as seen from the coast presents the appearance of a vast truncated cone. The summit, which has been thrice reached by Europeans, consists of syenitic granite, and is about 2 m. in length. Lofty detached mountains are visible to the eastward, apparently at least 7,000 ft. high, and a long chain stretches away in a S. S. W. direction. The main peninsular range is prolonged beyond Mt. Kina-Balu, and terminates in Cape Sampanmanjo. Apparently unconnected with it and much nearer the sea is Mt. Malu, in about lat. 4° N. with an altitude of 8,000 ft. In the central portion of the island, the Madi mountains form a group whence radiate several ranges toward different parts of the coast. Of these, one extends from Mt. Beringin, in about lat. 2° 30' N., easterly to Kaniungan point, and a second, the high Anga-Anga mountains, southward to Cape Salatan, the southern extremity of Borneo; there is also a third range which separates from the Anga-Anga mountains not far from their junction with the central group, and runs westward, as the Kaminting and Pembaringan mountains, until it is broken up into detached masses as it approaches the 110th meridian.—The navigable rivers of Borneo are numerous. Many of them are deep enough to admit of navigation by larger craft than can pass the bars which in most instances obstruct their entrance. It is said that on the N. W. coast, between Cape Datu and Cape Sampanmanjo, 23 rivers enter the sea, each navigable for vessels drawing 12 ft. of water to a distance of 100 m. above its mouth. Among these may be mentioned the Sarawak, which has two outlets, its western mouth being situated in about lat. 1° 20' N., lon. 110° 30' E. The anchorage near the town of Sarawak is 17 m. from the sea. The Batang-

Lupar is another large stream which drains the Sarawak territory. Its embouchure, which is 4 m. wide, is near lat. $1^{\circ} 25' N.$ and lon. $111^{\circ} E.$ Flowing seaward from within the confines of the same state are the rivers Rejang and Bintulu. Further N. E., in Borneo proper, is the Limbang, Kadayan, or Brunai, with the capital of the kingdom, a town of 25,000 inhabitants, known as Brunai or Borneo, on its left bank. The island of Labuan lies just without the bay or gulf into which it flows. Maludu bay, which indents the most northern portion of Borneo, receives a stream said to flow out of Lake Kina-Balu, a sheet of water near the mountain of that name, the existence of which is positively asserted by the natives, but which has not been seen by any European. The principal rivers which enter the Celebes sea are the Bulongan, which rises in the Anga-Anga range and flows eastward through the

Sooloo dominions, reaching the coast near lat. $3^{\circ} 10' N.$, lon. $117^{\circ} 30' E.$, and the Pantai, which has its sources in the same mountain group, and pursues a parallel course down to its mouth, which is about $2^{\circ} N.$ of the equator. The only river of any considerable length which flows into Macassar strait is the Koti, a stream which waters the region bearing its own name, and which is fed by numerous affluents. Its general course is S. E., and its delta occupies the coast region from 10 to 50 m. S. of the equator. The Banjar is the chief of the rivers having their outlet in the Java sea on the S. coast. It takes its rise near the middle of the island, and is a tortuous stream, flowing southward along or near the 115th parallel, and eventually separating into two branches, one of which is known as the Little Dayak river, the other and principal arm being the avenue to the important Dutch settlement of Banjar-



Mount Kina-Balu.

massin, which stands on its left bank. Other rivers on this coast are the Great Dayak, the Mendawi, the Sampit, the Pembuan, the Kotta-Waringen, and the Jelli. The great river of western Borneo is the Simpang, which drains the extensive region comprised between the peninsular range on the north and the western offshoot of the Anga-Anga mountains, portions of which are known as the Kaminting and Pembarangan ranges. Its general course is in a westerly direction almost under the equator, from its source in lon. $114^{\circ} 10' E.$ to lon. $109^{\circ} 20' E.$, where the Chinese town of Pontianak is situated on one of its main outlets just above the mouth. In 1823 a Dutch expedition in search of gold and diamond fields explored this river for a distance of 300 m. inland. The Sambas territory, further N., is watered by the Sambas river.—The greater

part of Borneo belongs to recent geological formations. The shallow seas which separate the island from Asia, and the resemblance between Bornean and Asiatic natural productions, indicate that at no very distant epoch the continent extended further S. W. than at present, and included Borneo as well as Sumatra and Java. No trace of recent volcanic action has been observed in Borneo, though the island is almost surrounded by one of the most important belts of volcanoes in the world, near which earthquakes (also wholly unknown in Borneo) are of weekly or monthly occurrence. The island is notably rich in mineral productions, among which are diamonds, gold, antimony, coal, tin, iron, copper, and lead. Diamonds occur in the sand and gravel of the river beds, at depths from 6 to 15 ft. below the surface, and in strata occasionally several feet in thick-

ness, whence they are obtained by Malays, who sink shafts in the rivers for this purpose. The largest diamond ever found in Borneo weighs 367 carats. Diamond washing is carried on to some extent in the Sarawak river, which yields small stones of brilliant water; but the largest product is in the Landak district, in the Dutch dominions, 40 m. N. of the equator. Gold is found in Sarawak as well as the districts under the government of the Netherlands, but only as small grains in alluvial deposits. The antimony exported from Borneo through Sarawak constitutes the chief supply of Great Britain. The principal mines are at Bidi, near which some traces of silver have been discovered. Coal of good quality occurs abundantly at the British island of Labuan, and in the Dutch Banjermassin district. It has also been found in Sarawak, and on the Koti river. Excellent iron ore abounds in the south, and is also met with in the northwest. The natives manufacture it into the best cutting blades to be found in the archipelago. A copper mine is worked by the Dutch in the Sambas country. Small quantities of platinum have been obtained in some localities, but this metal has never been profitably extracted.—The climate of Borneo is remarkably salubrious for an equatorial island. The low regions of coast land and extensive forest are hot and moist, with an average temperature throughout the year of about 70° F. between 6 and 7 o'clock A. M., and an annual rainfall in some places estimated at 300 inches. The wet season on the western side of the island is synchronous with the dry season on the eastern shores, from April to September, at the time of the S. E. monsoon; with the beginning of the N. E. monsoon in September the wet season sets in along Macassar strait and the shores of the Java sea, lasting till April. In the higher districts the climate is temperate and healthy.—The vegetation of Borneo is rich, luxuriant, and varied. The island is essentially a forest country, and abounds in gigantic trees. Brilliant flowers are scarce. The most striking vegetable productions are the wonderful pitcher plants of the botanical genus *nepenthes*, which here attain their highest development in form and color. They grow on the mountains, and vary greatly in size and appearance. The pitcher of one species will hold two quarts of water. They are usually green, with red, brown, and purple markings and linings. There are probably 100 species of ferns on the island, and the orchids are well represented. The finest fruit is furnished by the abundant durian tree, which resembles the elm in general appearance. A spiny oval mass contains the fruit in the form of a cream-colored pulp. Other fruit trees are the mangosteen, lansat, rambutan, jack, jambon, and blimbing. The bamboo is put to many important uses in the native economy. Among the valuable products of the Bornean forests are bananas, betel nuts, breadfruit, camphor, cocoanuts, ebony, gutta

percha, rattan, and sandal wood. The soil is generally very fertile, and yields rice, sago, manioc, cotton, sugar, cloves, nutmegs, poppies, and ginger. Melons and gourds are produced in large quantities, and in addition to the more distinctive fruits already mentioned are found the orange, lemon, mango, tamarind, and pomegranate.—The orang-outang or mias (*simia satyrus*) occupies the most prominent place in the fauna of Borneo, which, with the exception of Sumatra, where it is rarely met with, is believed to be its exclusive habitat. These creatures frequent the dense virgin forests of the low country, and are not to be found in the dry and elevated districts. The quadrumanas are further represented by the long-nosed monkey and at least ten other species. There are four species of lemur-like animals. The carnivora are sparingly represented, a species of arboreal panther (*Felis macrocelis*) being the most noteworthy animal of this order. The elephant is occasionally encountered in the north, and is believed to be identical with that of India. The only other large quadrupeds are deer and wild cattle (*bos Sondaicus*). Wild hogs roam through the forests in vast numbers. There are numerous bats and many characteristic species of squirrels. A curious representative of the insectivora is the small feather-tailed *ptilocercus Lowii*. Of birds there are parrots, woodpeckers, trogons, pheasants, partridges, hornbills, cuckoos, bee-eaters, and gapers. Of insects there are honey bees, 2,000 species of beetles, and no fewer than 29 species of *papilionids* or gorgeous swallow-tailed butterflies. Crocodiles, tortoises, and pythons and other serpents are met with. The adjacent seas and the rivers abound in fish, which form a considerable article of consumption and commerce.—The principal territorial divisions of Borneo are as follows: 1, Sarawak, an independent state under an English rajah, extending about 300 m. along the N. W. coast, with a population of 300,000; 2, Borneo proper, one of the few Malay kingdoms which remain in the archipelago, embracing the N. W. coast of the peninsula to Maludu bay, population unknown; 3, the Dutch territories on the S., E., and W. coasts, comprising Sambas, Banjermassin, and Pontianak, with an aggregate area of 201,541 sq. m., and a total population in 1869 of 1,189,303. These dependencies are included under the administration of the Dutch governor of Java.—The inhabitants comprise the aboriginal Dyaks and the immigrant Malays, Javanese, Chinese, and Bughis or natives of Celebes. The Dyaks are closely allied to the Malay race, but are more simple and honest, and morally superior in almost every respect. Their average stature somewhat exceeds that of the Malays; their hair is straight, coarse, and black, and they are well proportioned without any tendency to obesity. Agriculture is their principal means of subsistence. They are distinguished by many excellent traits of character, and when kindly

treated are docile, industrious, and faithful. They formerly gained great notoriety as daring pirates and head-hunters, seeking to decapitate others under the belief that every person beheaded would become the slave of the hunter in the next world. The greater portion of them have substantial dwellings, and cultivate rice, the banana, sugar cane, and some cotton and tobacco for their own consumption. They are skilled artificers in iron, and understand spinning and weaving, but have no written language. Dogs and fowls are their only domesticated animals. The distinction between Land Dyaks and Sea Dyaks is founded not upon the localities which they inhabit, but upon the favorite pursuits of the respective tribes, which lead some to cultivate the soil and others to a life on the water. Chinese settlers are found in all parts of the island, and engage in trade, local manufactures, and mining. The most active traders, however, are the Bughis, who are superior sailors, and visit every section of the coast in their light vessels.—Antimony, spices, camphor, gold, and diamonds are the principal articles of export from Borneo to Europe. The British and Dutch carry on a considerable commerce with the island, the former mainly through the free port of Singapore.—Borneo appears to have been visited by the Portuguese very early in the 16th century. Nearly 200 years later, in 1690, they acquired a temporary foothold in Banjarmassin, which they were soon compelled to relinquish. The Dutch subsequently established themselves on the same coasts, and in 1787 gained supremacy over Banjarmassin by a treaty with its sultan. The sway thus inaugurated has been maintained almost continually up to the present time. In 1823 they settled Pontianak. Great Britain made unsuccessful attempts to establish commercial factories in Borneo in the years 1702 and 1774; but owing to the foundation of the state of Sarawak under an English ruler, and the acquisition of Labuan as a colony, British influence is now paramount in the N. W. part of the island. (See SARAWAK.)

BORNHEIM, a village of Germany, in the province of Hesse-Nassau, close by Frankfort-on-the-Main, for the inhabitants of which it forms a favorite resort for pleasure; pop. in 1871, 6,396. On the *Bornheimer Heide*, near the town, on Sept. 18, 1848, Prince Lichnowski and Von Auerswald, two prominent conservative members of the German parliament, were assassinated by a mob.

BORNHOLM, an island in the Baltic, belonging to Denmark, 23 m. S. E. of Sandhammar point, Sweden, and 90 m. E. of Seeland; area, 225 sq. m.; pop. in 1870, 31,894. It is about 23 m. long by 18 wide. The coast is high and rocky, skirted in many places by dangerous reefs, and there are no good harbors for large vessels. A range of mountains with dry and sterile slopes runs through the interior; but the lower land is generally fertile. The island produces coal, marble, building stone, sheep,

and cattle; and earthenware is made. The capital is Rønne, at the S. W. angle of the island.

BORNOO, or **Bornu** (called by the natives *Kanowry*), a country of central Africa, between lat. 9° and 14° N., and lon. 8° and 15° E., bounded N. by the Great Desert, E. by Lake Tchad and Baghirmi, S. by Mandara, and W. by Housa. The country is level and wholly destitute of minerals. The chief rivers are the Komadugu and the Shary, which with numerous small streams flow into Lake Tchad. During the wet season large tracts are overflowed by the waters of the lake and rivers. The fertility caused by this inundation produces only a rank growth of grass from 10 to 12 ft. in height, and almost impenetrable thickets of underwood. Nearly all the wild animals, reptiles, birds, and insects common to central Africa infest this region in great abundance, and are driven to



Body Guard of the Sultan of Borneo.

the inhabited districts during the inundations. Domestic animals are also plentiful. The climate of Borneo, especially from March to the end of June, is excessively hot. During the rainy season, from May to October, fevers are prevalent. The soil is fertile, and, though but imperfectly cultivated, produces large crops. A species of millet forms the staple food of the people; rice and grain of an inferior kind are raised in small quantity. There are no fruits. The mass of the inhabitants, called Bornoose or Kanowry, are genuine negroes, peaceable and lazy, and wholly subject to the Arabs, who form the dominant race. The Arabs are described as arrogant, deceitful, and dishonest, and carry on the trade of the country, dealing chiefly in slaves. They are bigoted Mohammedans, but fetishism is still common among the negroes. The government of Borneo is nominally vested in a sultan, but all the power

really resides in an Arab sheik. The sultan is surrounded by a body guard of nobles and chiefs, clad in a grotesque and unwieldy garb. The military force of this monarch amounts to about 80,000, mostly cavalry. The principal towns are Kuka, the royal residence, Ngornoo, Dikoa, and Old and New Birnee. Most of them are populous, well built, and walled.

BORODINO, a small village of Russia, on the left bank of the Kolotcha, 2 m. above its junction with the Moskva, in the government and 70 m. W. S. W. of Moscow. It is famous for a battle between the French and Russians, Sept. 7, 1812. The French army, under Napoleon, numbered 125,000, while the Russian forces, commanded by Kutuzoff, Prince Bagration, and Barclay de Tolly, were nearly 160,000 strong. The battle commenced in the early morning, and raged with great fury until 3 o'clock in the afternoon, when the Russians gave up the field and retreated. The total loss of the Russians was 52,000 men, and that of the French 80,000. The former, having retreated in good order, never acknowledged the battle as a defeat, and in 1889 raised a mausoleum on the field as a trophy of victory. The French call it the battle of the Moskva, and it gave Marshal Ney his title of Prince of Moskva. The actual battle field was on the opposite side of the Kolotcha from Borodino.

BORON, the characteristic combustible element of the acid contained in borax. In nature it is always met with in combination with oxygen. It is found in small quantities, and only in a few localities. It presents considerable analogy with silicon in its properties and its mode of combination, and like it may be obtained in two distinct modifications, the crystalline and the amorphous. Berzelius obtained boron by heating the borofluoride of potassium with an equal weight of potassium in a covered iron crucible. Boron as thus obtained is an amorphous, dull olive-green powder, which before it has been strongly ignited soils the fingers, and is dissolved by pure water in small quantity, forming a greenish yellow solution; from which, however, it is precipitated unchanged on adding a little solution of sal ammoniac. Boron is not oxidized by exposure to air, to water, or to solutions of the alkalis, whether cold or boiling. It is, however, easily oxidized when treated with nitric acid or with aqua regia. After exposure to intense heat in vessels from which air is excluded, it becomes denser and darker in color. It may be fused by the application of a heat still more intense than that required to melt silicon. As first obtained, boron exhibits a strong attraction for oxygen, and, if heated in air or in oxygen, takes fire below redness, burning with a reddish light and emitting vivid scintillations; it is thus converted superficially into boric anhydride, B_2O_3 , which melts and protects a portion of the boron. Mixed with nitre and heated to redness, it deflagrates powerfully. It is also oxidized when ignited with hydrate of potash;

and when heated with carbonate of potassium in fusion it sets carbon free, and forms borate of potassium. Pulverulent boron, like silicon, is a non-conductor of electricity. Boron may be obtained in the amorphous form in large quantity by the following method (Wöhler and Deville; Liebig's *Annalen*, cv. 67): 1,500 grains of fused boric anhydride are coarsely powdered and mixed rapidly with 900 grains of sodium cut into small pieces. The mixture is then introduced into a cast-iron crucible previously heated to bright redness; 700 or 800 grains of solid but previously fused chloride of sodium are placed upon the top of the mixture, and the crucible is covered. As soon as the reaction is over, the still liquid mass is thoroughly stirred with an iron rod, and poured while red hot, in a slender stream, into a large and deep vessel containing water acidulated with hydrochloric acid. The undissolved pulverulent boron is then collected on a filter and washed with acidulated water till the boric acid is got rid of; after which the washing is continued with pure water till the boron begins to run through the filter. It must finally be dried upon a porous slab without the application of heat.—*Crystallized Boron*. In order to convert the amorphous into the crystallized form, the following method may be adopted: A small Hessian crucible is lined with the pulverulent boron made into a paste with water, and the boron is pressed in strongly, as in the ordinary mode of lining a crucible with charcoal. In the central cavity a piece of aluminum weighing from 60 to 90 grains is placed; the cover is luted on and the crucible enclosed in a second, the interval between the two being filled with recently ignited powdered charcoal. The outer crucible is next closed with a luted cover, and the whole exposed for a couple of hours to a heat sufficient to fuse nickel. The temperature is then allowed to fall, and when cold the contents of the inner crucible are digested in diluted hydrochloric acid, which dissolves out the aluminum; beautiful crystals of boron are left, generally transparent, but of a dark brown color. Numerous scales of boron are formed at the same time, in pale copper-colored, opaque, six-sided plates, which consist of an alloy of aluminum and boron, formerly erroneously called graphitoid boron. Crystallized boron has a specific gravity of 2.68; it assumes the form of transparent octahedrons belonging to the pyramidal system. These crystals when pure are nearly colorless, but they usually contain traces of foreign matter, which give them a pale yellow or red color; they refract light powerfully, and are hard enough to scratch the ruby, and even sensibly to wear away the diamond. Crystallized boron burns imperfectly in oxygen when heated to full whiteness, and becomes coated with a layer of fused boric anhydride. It however burns easily when heated to redness in dry gaseous chlorine, becoming converted into the

gaseous terchloride of boron. No acid or mixture of acids has any action upon the crystalline boron.—The atomic weight of boron is 10.9. The hardness of boron has suggested its use as a substitute for the diamond in cutting glass, for drills, and bearings of machinery; but the cost of production has hitherto prevented its extensive application.

BOROUGH. The origin of this term is uncertain. By some etymologists it is derived from *burgh* (Sax.), *burgus* (Lat.), a walled town, and thence applied to any association of families in a neighborhood, for the purpose of mutual protection. By others it is deduced from *borgh* or *borha* (Sax.), pledge, referring to the civil division into tithings or decennaries, hundreds, &c., in which the inhabitants composing the tithing or hundred were pledges for the good conduct of each other. It is probable that in an early period, when great disorder prevailed, protection was the principal object of the vicinage of houses which was denominated a borough. The term *villa*, from which is derived the modern *village*, originally signified a private country residence, but was afterward applied to a number of buildings placed near each other for the common safety of the inhabitants. It appears from "Domesday Book" that there were 82 boroughs in England, including cities, at the time of the Norman conquest. Though differing as to the extent of their franchises and mode of government, they were alike in two respects: 1, in having a fair or market; 2, in having a borough court independent of the hundred. A third particular afterward became the distinctive franchise of boroughs, viz., the right of sending burgesses to parliament. The original object of mutual defence was merged in another, viz., privileges of trade; and not long after the conquest the guild, which was an association of persons in a particular trade, became so intermingled with the original constitution of boroughs that it is difficult to distinguish the respective franchises belonging to each, and the guild merchant, which was a kind of incorporation or licensed association of all the trades, became substantially the borough, or at least became possessed of its franchises, government, and name. Membership of the guild thus became the principal mode of obtaining the freedom of the borough. The number of burgesses was by no means coextensive with that of the inhabitants; in fact, the boroughs were generally oligarchies, especially those which were created by charters after the conquest. The government was in many instances engrossed by a body self-constituted as the guild merchant, and in some cases even by a particular guild. Borough franchises were derived from charter or prescription (which was founded upon a supposed charter), and consisted at first of particular privileges, as that of a fair or market, of having a court, exemption from toll, and the like. Charters of incorporation were first granted in the reign

of Henry VI., although the ancient boroughs had in fact used the privileges peculiar to corporations, viz., of governing themselves, and of holding property in common. But from the period above mentioned, the history of boroughs belongs to the subject of municipal corporations, with the exception of parliamentary franchise. Before the act of 1832, known as the act for parliamentary reform, there were 171 boroughs in England, represented by 839 burgesses; from Scotland there were 15 members for boroughs, and from Ireland 36. By that act 56 English boroughs which had become insignificant in population were wholly disfranchised, 80 were deprived of one member each, and the right was given to 22 boroughs, which were before unrepresented, of returning two members each, and to 19 boroughs of returning one member each. The right of voting was also extended from a small privileged class to the citizens at large having certain qualifications. By the reform act of 1867 11 more boroughs were disfranchised; 23 were deprived of one member each, and 25 members were given to new boroughs and universities. Previous to the act last mentioned the whole number of representatives from boroughs in the English parliament was 387 from England and Wales, 23 from Scotland, and 39 from Ireland; but by that act 28 of this number were distributed among the larger counties, which were divided into districts for the purpose. In the whole kingdom the number of members for boroughs is now 366.—In the United States the term borough is applied to an incorporated village or town, but not to a city. In England it includes cities as well as villages, though in some old statutes the terms city, borough, and village are used distinctively.

BOROVITCHI, a town of Russia, in the government of Novgorod, on the Msta, 155 m. S. E. of St. Petersburg; pop. in 1867, 9,108. It has nine churches, two schools of a high grade, and several manufactories.

BOROVSK, a town of European Russia, in the government and 50 m. N. of the city of Kaluga, on the Protva; pop. in 1867, 8,826. It contains many churches, and near the town is one of the richest convents of the empire. There are extensive manufactories of sail cloth and of woollen goods, and there is an active trade in these articles, as well as in flax, hemp, and leather.

BORROMEAN ISLANDS, a group of four small islands in the gulf of Tosa, an arm of Lago Maggiore, in northern Italy. The group takes its name from the Borromeo family, in whose possession it has been for more than 600 years. The separate islands are called Isola Madre, Isola Bella, Isola dei Pescatori, and Isolino. They were little more than barren rocks prior to 1671, when Vitaliano, Count Borromeo, caused soil to be transported from the shores of the lake, terraces to be made, and all the trees and flowers to be planted which would grow in that climate. Isola Bella was most



Isola Bella, Borromean Islands.

richly adorned, being formed of ten successive terraces covered with beautiful trees and flowers, interspersed with statues and other works of art. At the west end is an elegant palace. Isola Madre, which is the largest, being 3 m. in circumference, consists of seven terraces, and has also a palace. Isola dei Pescatori contains a little village peopled with fishermen.

BORRAMEO, Carlo, count, a saint and cardinal of the Roman church, born at Arona on Lago Maggiore, Oct. 2, 1538, died in Milan, Nov. 4, 1584. From his earliest childhood he was remarkable for his virtues. He studied civil and canon law in the university of Pavia, and took his degree in 1559. At the close of the same year his maternal uncle, Cardinal de' Medici, became Pope Pius IV., and successively made him archbishop of Milan, a cardinal, grand penitentiary, and president of the Roman council. He lived in the midst of great splendor, but in his own habits was temperate, studious, and devoted to the duties of his station. He instituted many reforms in the administration of affairs in the states of the church, and carried them into effect with vigor and wisdom. Through his agency the council of Trent was reopened, and its deliberations concluded. On the death of his elder brother he was urged, even by the pope himself, to leave the service of the church and take his position at the head of his family. This he refused to do, and determined to go to Milan and devote himself altogether to the interests of his diocese. He was greeted with great enthusiasm by the people, but before he had fairly addressed himself to the work before him was recalled to Rome by the death of the pope. His influence had much effect in securing the election of Pius V. He then returned to Milan, and set himself to work vigorously correcting abuses and reforming the manners of priests and people. He met with considerable opposition, and the Humiliati attempted to have him assassinated, in consequence of which the order was abolished, and its revenues were distributed among the poor. The cardinal instituted the order of Oblates, founded a great number of

schools, and is generally regarded as the first to establish Sunday schools. He associated with himself in his labors of reform a council chosen from the diocese at large, and put down with a resolute hand the pretensions of his suffragan bishops who resisted his measures of church discipline. He succeeded also in improving the secular government of Milan. His charities were munificent, not only his ecclesiastic revenues but his personal fortune and the works of art and ornaments of his palace being devoted to the relief of the poor and suffering. During the plague of 1576 he organized and superintended measures for the care of the sick and the burial of the dead. The magistrates had fled, and he had for a time the entire control of the city. The exertion, however, was too great for his physical strength, and his health soon became broken. His death was regarded as a national calamity, and was universally mourned throughout Italy. He was buried beneath the high altar in the cathedral of Milan, and his tomb became a shrine visited by pilgrims from all parts of the country. He was canonized by Paul V. in 1610. A collection of his works, including sermons, letters, the acts of his diocesan synods, and conferences delivered at the academy of the Vatican, under the title of *Noctes Vaticanæ*, appeared at Milan in 1599 (2 vols. fol.), and was republished with notes by Sax (5 vols. fol., Milan, 1747). The biography of St. Charles Borromeo has been written by Godeau, bishop of Venice (2 vols. 12mo, Paris, 1748), by Tournon (8 vols. 12mo, Paris, 1761), and by the Italian Guissano (1751). A life in English by E. H. Thompson was published in London in 1858. His statue was erected near Arona, and his festival is celebrated Nov. 4.

BORRAMEO, Federico, count, cardinal, and archbishop of Milan, cousin of St. Charles, born at Milan in 1563 or 1564, died in 1631. He founded the Ambrosian library at Milan in 1609, and devoted to it most of his fortune. He sent Oligati to Germany, the Netherlands, and France, Ferrari to Spain, Salmaci to Greece, and Father Michael, a Maronite priest,

to Syria, to collect MSS. for it. He added to it a printing establishment, and founded academies, schools, and charitable institutions.

BORRONEO, St. Charles, Sisterhood of, a religious association founded in 1652 by the abbé d'Estival, for educational and charitable purposes. It has its chief organization at Nancy, in Lorraine. A religious association of St. Charles Borromeo was founded in Bonn in 1846, for the distribution of Roman Catholic publications.

BORROMINI, Francesco, an Italian architect, born at Bissono in 1599, died in Rome in 1667. He studied sculpture and architecture for about seven years in Milan, and then went to Rome, where he was employed under his kinsman, Carlo Maderno, in finishing St. Peter's. On the death of Maderno he continued at work under Bernini. He became capricious and fantastic in his designs, and killed himself in a fit of insanity.

BORROW, George, an English author, born near Norwich in February, 1803. He is the son of an officer in the army, and received his early education at various schools in England and at the high school in Edinburgh. At the age of 15 he was articled to a solicitor in Norwich, but soon turned his attention to philology, studying especially the language and habits of the gypsies, with whom he led a wandering life for some years. In 1833 he entered the service of the British and foreign Bible society, and was sent to Russia. Here he edited the New Testament in the Mantchou language, and published a book which he called "The Targum," containing metrical translations from 30 languages. He then went to Spain, where he mingled with the gypsies, translated the Gospel of Luke into their language, edited a translation of the New Testament into Spanish, and was thrown into prison for circulating the Bible. Having returned to England, he published in 1841 "The Zincali: an Account of the Gypsies in Spain," with a collection of their songs and a vocabulary of their language. In 1843 he published "The Bible in Spain," a narrative of his personal adventures. He afterward travelled for some time in Turkey and Wallachia. In 1851 he published "Lavengro: the Scholar, the Gypsy, and the Priest," a work autobiographical in form, but apparently containing much fiction. In 1857 he published "The Romany Rye," a sequel to "Lavengro;" and in 1862 "Wild Wales." He has also contributed much, both in prose and verse, to various periodicals.

BORSA, a village of Hungary, in the county of Mármaros, 45 m. S. E. of Szigeth, at the entrance of a gorge leading into Bukowina; pop. in 1870, 5,508. In the neighborhood are some mines of gold, argentiferous lead, and copper.

BORSOD, a N. county of Hungary, bounded E. in part by the Theiss and the Hernád, and traversed by the Sajó; area, 1,870 sq. m.; pop. in 1870, 195,087, chiefly Magyars. The soil is mountainous or hilly in the northwest, and

level in the east and south. Cattle are reared in great numbers on extensive pastures. Borsod wheat is celebrated, and the county is called Little Hungary on account of its extraordinary productiveness in the principal staples of the country. The forests contain various kinds of timber and plenty of game. The vine culture is extensive. Minerals abound, and iron is worked to a large extent, and partly converted into steel. The county contains a number of large and over 170 small villages, and derives its name from that of Borsod, 5 m. S. of Szendrő, which contains a Protestant church and an old castle. Capital, Miskolcz.

BORY DE SAINT VINCENT, Jean Baptiste George Marie, a French naturalist, born at Agen in 1780, died in Paris, Dec. 22, 1846. He visited Mauritius and Bourbon in 1800, explored St. Helena and various other African islands, and on his return published *Essais sur les Îles Fortunées et l'antique Atlantide* (4to, Paris, 1803), and an illustrated *Voyage dans les quatre principales îles des mers d'Afrique* (8 vols. 8vo, 1804). He served in the French army under Davoust, Ney, and Soult, the last of whom subsequently employed him in the ministry of war. Exiled after the restoration, and hunted by the police through many of the states of Europe, he remained a fugitive till 1820, during which time he assisted in editing the *Annales générales des sciences physiques* at Brussels, and wrote his *Voyage souterrain*, describing the subterranean quarries of Maestricht. In 1829 he was chief of an official scientific expedition to the Morea and the Cyclades, and was the sole author of the botanical portion of the *Expédition scientifique de Morée* (1832 et seq.), besides writing with Chaubard the *Nouvelle flore du Péloponnèse et des Cyclades* (1838). He was in the war department in 1880, and rose to the rank of *maréchal de camp* in the corps of engineers. In 1839 he was appointed chief of a scientific expedition to Algeria. He was the principal editor of the *Dictionnaire classique de l'histoire naturelle*, writing nearly half of the first 10 volumes. He wrote two works on Spain, a history of microscopic animals, and *L'homme, essai zoologique sur le genre humain* (2 vols., 2d ed., Paris, 1827), the last being one of his most original productions.

BORYSTHENES. See DNIPEP.

BOS, Lambert, a Dutch philologist, born at Workum, Friesland, Nov. 23, 1870, died Jan. 6, 1917. He was instructed by his father in Greek and Latin, and studied philology and oriental languages at Franeker, where he became professor of Greek. His principal works are *Ellipses Græcæ* (1702) and *Vetus Testamentum ex Versione Septuaginta Interpretum* (1709; new ed., 5 vols., Oxford, 1805).

BOS, Bosch, or **Bosco, Hieronymus**, surnamed the Joyous, a Flemish artist, born at Bois-le-Duc after the middle of the 15th century, died in the early part of the 16th. Few particulars of his life are known. He excelled in painting demons, monsters, infernal scenes, and similar

fantastic subjects. Among his masterpieces are the "Temptation of St. Anthony," the "Flight into Egypt," the "Fall of the Angels," the "Adoration of the Kings," and the "Triumph of Death," mostly preserved in the art galleries of Spain, where Bos is believed to have spent a part of his life. His gloomy and wildly grotesque pictures and engravings were especially pleasing to Philip II.

BOSA, a town of the island of Sardinia, in the province of Cagliari, situated at the mouth of the river Termo; pop. 6,800. It is the seat of a Catholic bishop, has a college, and a considerable coral fishery.

BOSBOOM, Johannes, a Dutch painter, born at the Hague, Feb. 18, 1817. He studied under B. J. van Bree, and his best works are city views and church interiors, including "The Tomb of Engelbert II. of Nassau, in the church at Breda;" "The Great Church of Amsterdam," in the royal gallery at Munich; "Franciscan Monks chanting a Te Deum;" "The Holy Communion in a Protestant Church;" and "The Hall of the Consistory at Nimeguen." The last three pictures obtained a medal at the Paris exposition of 1855; and his "View in the Church of Alkmaar" and "Rotterdam Cathedral" appeared in that of 1867.

BOSC, Louis Augustin Guillaume, a French naturalist, born in Paris, Jan. 29, 1759, died there, July 10, 1828. He held public offices until the reign of terror, when he sought refuge in the forest of Fontainebleau. He visited the United States in 1796-'8, and contributed much toward diffusing in France a better knowledge of American natural history. He was for some time chief director of prisons, went on missions to Italy and to the wine districts of France, edited an agricultural cyclopædia, wrote extensively for various publications on natural history, with all branches of which he was singularly conversant, and became professor at the zoölogical garden of Versailles, afterward of Paris, and member of the academy. He acquired additional celebrity by his devotion to his former official chief Roland, and to Mme. Roland, whose memoirs he saved from destruction. After having been the tutor of Mlle. Roland, he became her guardian at the request of her parents, adopted her as his daughter, and recovered for her the confiscated property of her family. His chief works are: *Histoire naturelle des coquilles* (5 vols., 2d ed., Paris, 1824); *Histoire des vers et des crustacés* (2 vols., 2d ed., 1829); and his elaborate and renowned descriptions of the French wine districts.

BOSCAN (BOSCAN ALMOGAVAR), Juan, a Spanish poet, born in Barcelona before 1500, died in Perpignan about 1543. A patrician by birth, he was received at the court of Charles V. in Granada, served in the army, superintended for some time the education of the famous duke of Alba, travelled extensively, was converted to Italian forms of versification by Andrea Navagero, ambassador of Venice in Spain, and became the founder of a new Spanish school of

poetry, which has prevailed ever since. He wrote *Leandro* (1540), a long tale in blank verse after the model of Bernardo Tasso, on the basis of the "Hero and Leander" of Musæus. In the same year he translated Castiglione's "Courtier," which acquired celebrity as the most classical Spanish prose work of those days. His complete works were published by his widow in 1543, and consist of four books, the first containing poems of the old Castilian school, the second and third his poetry after Petrarch and other Italian models, and the fourth, "The Allegory," being the most original and celebrated of all. Among his works are poetical epistles after the manner of Horace, pastorals, and eclogues.

BOSCAWEN, Edward, a British admiral, third son of Hugh Boscawen, the first Lord Falmouth, born in Cornwall, Aug. 19, 1711, died near Guilford, Jan. 10, 1761. His mother was the daughter of a sister of Marlborough. Entering the navy at an early age, he was promoted to the rank of captain in 1737. In 1744 he captured a French frigate in the channel. He commanded all the land and naval forces sent to the East Indies in 1748, and the squadron employed against the French off Newfoundland and at Louisburg in 1758. The next year he gained a decisive victory over the French off Lagos, capturing three vessels and destroying two others. On his return to Spithead with his prizes and 2,000 prisoners, he received the freedom of the city of Edinburgh, and was made governor of the marine forces, with a salary of £3,000 a year, after having previously occupied the highest positions in the navy and the admiralty; and he also served for many years in parliament. Admiral Boscawen, one of the bravest of seamen, was styled by Horace Walpole the most obstinate of an obstinate family. Lord Chatham said: "When I apply to other officers respecting any expedition I may chance to project, they always raise difficulties; Boscawen always finds expedients."

BOSCH, Hieronymus de, a Dutch philologist and Latin poet, born in Amsterdam, March 23, 1740, died in Leyden, June 1, 1811. His *Poemata* (Leyden, 1803) are among the best Latin poems of modern times. His great work is the *Anthologia Græca* (4 vols., Utrecht, 1795-1810; 5th volume by Van Lennep, 1822). He was one of the founders of the Dutch institute for science and art, and curator of the Leyden university.

BOSCOVICH, Ruggiero Giuseppe, an Italian natural philosopher, born at Ragusa, May 18, 1711, died in Milan, Feb. 12, 1787. He was a member of the society of Jesus, a distinguished mathematician and astronomer, and the originator of a system of natural philosophy which regards the senses as immediately cognizant, not of matter itself, but only of the attractive and repelling forces which particles exercise upon each other. His *Philosophiæ Naturalis Theoria* (Vienna, 1758) expounded the doctrine of the propagation of pressure through solid

bodies, and threw much light upon the comparatively new doctrine of cohesion. He was for many years professor of mathematics in the Roman college, and for six years in the university of Pavia. Subsequently he became professor of astronomy and optics at Milan, where he established an observatory. He was employed in measuring a degree of the meridian, in correcting the maps of the Papal States, and in settling boundary questions. He was a member of the royal society of London and of many other learned bodies at home and abroad. After the abolition of his order in 1773, he spent several years in Paris as director of the optical department in the navy, receiving a pension of 3,000 livres. Vexed by the jealousy of D'Alembert and others, he returned to Italy, superintended at Bassano the publication of his complete works (5 vols., 1785), visited Rome, and finally retired to Milan. Among his writings on astronomy and other branches of physical science are *De Maculis Solaribus* (1786) and *De Expeditione ad Dimentiendo Secundum Meridiani Gradus* (Rome, 1755). His didactic poem *De Solis ac Lunæ Defectibus* (London, 1764) was translated into French by the abbé de Barruel (Paris, 1779). He published annotated editions with supplements of Noceti's works on the rainbow and the aurora borealis, and of Benedict Stay's poems on the Cartesian and other modern philosophical systems. His narrative of his journey from Constantinople to Poland appeared in French in 1772, in German in 1779, and in Italian in 1784.

BOSIO, Angiolina, an Italian vocalist, born in Turin, Aug. 20, 1829, died in St. Petersburg, Aug. 12, 1859. She belonged to a family of dramatic artists, studied in Milan under Ottavio, made her début at Turin in Verdi's *I due Foscari*, and afterward sang with great success in Copenhagen and Madrid. Her first appearance in Paris was in Verdi's *Nabucco* in 1848; and she acquired celebrity there afterward in the same composer's *Luisa Miller* and in Rossini's *Moïse*. She visited Cuba and the United States in 1849, and after new triumphs in London and other capitals, accepted an engagement at the Italian opera in St. Petersburg, dying there from a cold in the zenith of her fame. Her voice was a pure soprano of power and sympathetic quality, and her style refined and polished, though she was deficient in vehemence. She was married to a gentleman named Xindavelonia.

BOSIO, François Joseph, baron, a French sculptor, born in Monaco, Italy, March 19, 1769, died in Paris, July 29, 1845. He studied under Pajou, but became to some extent a follower of Canova, was employed by Napoleon and by the successive Bourbon and Orleans dynasties, and was ennobled by Charles X. He executed the bass reliefs of the column on the place Vendôme, the equestrian statue on the place des Victoires, and many other works in France and Italy, among the best known of which are those connected with the mausoleum of the

countess Demidoff in Père-la-Chaise. He was a member and eventually director of the Paris academy of fine arts.

BOSJESMANS. See BUSHMEN.

BOSNA-SERAI, or *Seraye*, a city of European Turkey, capital of the province of Bosnia, at the confluence of the rivers Miliatchka and Bosna, in lat. 43° 52' N., lon. 18° 40' E., 560 m. N. W. of Constantinople; pop. about 60,000. It is surrounded by a wall of no considerable strength, and has a citadel with fortresses out of repair. The houses are mostly of wood. There are about 100 mosques, several schools, a number of Greek, and four Roman Catholic churches. The majority of the inhabitants are Moslems; the rest are Greeks, Catholics, and Jews. The Jews have a considerable part of the commerce. Bosna-Serai is a great entrepot of traffic between Turkey, Dalmatia, and Croatia; it exports leather, hides, wool, goats' hair, cattle, and smoked fish, and imports cotton and woollen stuffs, silks, lace, paper, salt, glassware, and jewelry. It has manufactures of leather, cotton, woollen, iron, copper, cutlery, and firearms. The city was founded by the Hungarians about 1263 under the name of Bosznvár. It derives its present surname Serai (palace) from a palace built in 1580 by Khosrev Bey, the governor of Bosnia. Prince Eugene captured the town in 1697, but was unable to take possession of the citadel.

BOSNIA (properly Bosna; Turkish, *Bosh-maili*), the extreme N. W. province or vilayet of European Turkey, lying between lat. 42° 30' and 45° 15' N. and lon. 15° 40' and 21° 10' E., comprising Bosnia proper, Herzegovina, and Turkish Croatia; area estimated from 22,500 to 24,450 sq. m.; pop. about 1,100,000. It is bounded N. W. and N. by Austrian Croatia and the Military Frontier, E. by Servia, S. by Prizrend, Albania, and Montenegro, and W. by Dalmatia and the Adriatic. The surface is mountainous, the elevations ranging from 3,000 to 8,000 ft. A branch of the Dinaric Alps forms the watershed between the tributaries of the Danube and the rivers flowing S. The mountains consist chiefly of limestone of secondary formation, together with sandstone and shales of the carboniferous system; and it is also said that beds of coal are general throughout the country. The valleys are well watered. The chief rivers are the Save on the N. frontier, and its affluents the Unna, Verbas, Bosna, and Drina, and the Narenta, which flows into the Adriatic. The mountains are densely covered with forests. Sheep, goats, pigs, and poultry are raised in great numbers, but cattle and horses are neglected. The chief food is wheat and maize; barley, hay, hemp, &c., are cultivated to some extent. In Herzegovina tobacco, rice, oil, wine, figs, and pomegranates are produced. The culture of fruit is important, 300,000 quintals of prunes alone being produced annually. Fisheries are active, chiefly in the Bosna and Narenta rivers. The great mineral wealth of the country is undeveloped, but a few mines of

lead, iron, and mercury are worked. The chief manufactures are cutlery and firearms. Among the exports are staves, timber, agricultural products, wool, honey, and wax. The total value of imports is about \$5,000,000, a great part of which consists of salt. Most of the merchandise comes from Constantinople and Sophia, to Bosna-Serai or Serajevo; but commerce is much impeded by bad roads, imposts, monopolies, and the sand banks and trunks of trees in the rivers, which render navigation almost impossible. The most important towns are the capital, Bosna-Serai, Banialuka, Travnik, Mostar, Fotcha, and Novi-Bazar. Of importance in a military point of view are the fortresses Sienitzza, Vishegrad, near the frontier of Serbia, Nikshity, near the frontier of Montenegro, Bielina, and Trebinye, the last on the main road leading to Ragusa. The towns are generally divided into three



Bosnians.

parts: the fortress, the city proper, surrounded by walls and having the gates closed at night, and the quarter occupied by the lower classes. Nearly the whole population belongs to the southern Slavs, who entered the country in the 7th century and dislodged the Illyrian race, which was probably identical with the Albanian. A remnant of the Albanian element, numbering about 30,000 souls, is found in the S. E. corner of the country. The prevailing language is a dialect of the Servian. The majority of the population are Christians, 431,000 belonging to the Orthodox Greek and 192,000 to the Roman Catholic church. There are about 5,000 Jews and 8,000 gypsies. The Mohammedans, 418,000 in number, are nearly all descendants of Slavs who embraced Islamism in order to preserve their estates, and include the wealthier part of the population, chiefly in the towns. A large portion of the commerce

of the country is in their hands. They comprise the beys, nobility, agas (land owners), and spahis, the descendants of the nobility whose ancestors were invested with fiefs at the time of the conquest. Their vassals pay them a tribute, and in war they form a cavalry of reserve. The Bosnians, especially the Christians, are hospitable, pious, and brave, but irascible and vindictive. The head of the family has a patriarchal jurisdiction over it, and his wife or son's wife has sole management of the house. The people are generally but little instructed; they have some knowledge of mechanics and of the elements of medicine, but scarcely any literature. There were formerly printing presses at Milesevo and Goradye, where church books in Slavic were printed as early as 1531.—Bosnia anciently belonged partly to Lower Pannonia and partly to Illyricum. In the 7th century the country was invaded by the Slavs. In the 12th and 13th centuries it belonged to Hungary. In 1389 it passed into the hands of the Servian king Stephen, after whose death it formed an independent government till 1397, when one of the chieftains, Ban Tvartko, seized the reins of power as king of Bosnia. At the beginning of the 15th century Turkey asserted its claims upon the province, finally annexing it in 1528; since then, however, the native nobility have frequently caused disturbances, especially in 1850 and 1851. The legal contingent of Bosnia in the Turkish army is 80,000, but it actually consists of only about 30,000. In 1857-'8 an insurrection of the peasantry took place at Tuzla against the exactions of the tax gatherers and beys. After an encounter with the troops they took refuge in Austrian territory, but returned upon a proclamation of amnesty. In 1861 another insurrection took place, and before it could be put down the war in Montenegro broke out, peace not being restored in Bosnia till after the suppression of the rebellion in the former country. A conference was held by the consuls of the European powers, but without any salutary effects. In May, 1863, an Austrian and Ottoman mixed commission met at Livno to define the boundaries between Bosnia and Dalmatia. During the administration of Osman Pasha, 1860-'68, Bosnia enjoyed peace and made considerable progress. A railway has been in course of construction since 1870 from Banialuka to the frontier near Novi, as the first section of the great line from the Austrian frontier to Constantinople.

BOSPORUS (Gr. *Βόσπορος*, ox-ford). 1. Called by the ancients the Thracian, and by the Turks Istambul Boghazi, the strait joining the Black sea and the sea of Marmora, between European and Asiatic Turkey; so named either from the legend of Io, who after being metamorphosed into a heifer passed over the channel, or because the strait is so narrow that an ox can swim across. It is about 16 m. long; its greatest width is about 2 m., and its narrowest part, near the middle, only a little



Castles of Europe and Asia.

over $\frac{1}{2}$ m. There are in this channel surface currents and undercurrents, the former flowing southward except during the prevalence of S. winds, and the latter flowing northward to the Black sea. In the narrowest part the current is very strong. Here are the castles of Europe and Asia, Rum-ili Hissar on the European side, built by Mohammed II. in 1451, and Anadolu Hissar on the Asiatic side, previously erected by Mohammed I. The sides of the channel are steep wooded cliffs, studded with ruins of all ages and gay buildings of the present day. According to tradition, confirmed by geological testimony, this strait was formed by the bursting of the barriers of the Black sea. It was anciently and is still famous for its extensive tunny fisheries. Constantinople and Scutari lie on the opposite shores of the southern entrance. From the former city the strait is frequently called the strait of Constantinople. **II.** Called by the ancients the Cimmerian, and now the strait of Kertch or Yenikale, formerly of Kaffa or Feodosia, the strait connecting the Black sea and the sea of Azov. It is wider and shallower than that of Constantinople. **III.** An ancient kingdom, comprising the country on both sides of the Cimmerian Bosphorus, founded in 502 B. C. by the Archæanactidæ, a native Cimmerian dynasty, who were succeeded about 440 by a Greek dynasty, beginning with Spartacus I. The capital was Panticapæum (now Kertch) in the Tauric Chersonesus (Crimea). Under a later Spartacus (358-348) the limits of the kingdom on the Asiatic side were enlarged, Theodosia (Kaffa), on the European, having been annexed under his predecessor, Leucon I., in 360. About 280 Leucon became tributary to the Scythians. These latter became so exacting

that Parysades II., the last of the Leuconides, placed himself under the protection of Mithridates the Great of Pontus, who defeated the Scythians, and after the death of Parysades took possession of Bosphorus and placed his own son Machares on its throne. After his death and that of his father (63 B. C.) the Romans appointed his brother Pharnaces to succeed him, and after his overthrow by Cæsar several other princes who professed to belong to the family of Mithridates. When the line became wholly extinct in A. D. 259, the Sarmatians took possession of the country. It later formed part of the Eastern empire till its conquest by the Khazars, and was afterward taken by the Tartars.

BOSQUE, a central county of Texas, bounded E. by the Brazos river, and watered by North Bosque creek, and other affluents of the Brazos; area, 905 sq. m.; pop. in 1870, 4,981, of whom 528 were colored. The surface is hilly or undulating; about one third of it is covered with forests of oak, live oak, and cedar. The soil is a dark loam resting on bases of hard blue limestone. The chief productions in 1870 were 38,665 bushels of wheat, 260,946 of corn, and 2,165 bales of cotton. There were 8,071 horses, 4,829 milch cows, 21,022 other cattle, 5,607 sheep, and 8,971 swine. Capital, Meridian.

BOSQUET, *Pierre Joseph François*, a French soldier, born at Mont de Marsan, Nov. 8, 1810, died Feb. 5, 1861. He was educated at the polytechnic school of Paris and the military school at Metz, and acquired distinction in Algeria, attaining in 1848 the rank of general of brigade, and was wounded in the campaign against the Kabyles in 1851. In the Crimea he had the command of the second division, and was prominent in the battles of the Alma and

of Inkerman, in the latter of which but for his succor the English would have been crushed by the Russians. As chief of the corps destined to cover the allied forces on the slope of the Tchernaya, he constantly displayed quickness, vigilance, and activity, and took part in the storming of the Malakhoff, after which he was made a senator and a marshal. In 1858 he was appointed commander of the S. W. military division, but, disabled by the wounds received at Sebastopol, he was obliged to refrain from active duties.

BOSSI, Giuseppe, an Italian painter, born at Busto-Arsizio in August, 1777, died in Milan, Dec. 15, 1815. He studied at the Brera academy and in Rome, and on his return to Milan became secretary of the academy of fine arts, and afterward president of that institution and of those of Venice and Bologna. In 1801 he won a first prize for a picture commemorating the conclusion of peace, and in 1805 he exhibited various works, the best of which was a large cartoon representing the Italian Parnassus, which is in the museum of Milan. For Eugène de Beauharnais he executed a celebrated copy of Leonardo da Vinci's *Cena*, and published in 1810, as the result of his investigations relating to this famous masterpiece, *Libri quattro sul Cenacolo di Leonardo da Vinci*. He also participated in the biography of Leonardo da Vinci, and left an unfinished work on Lombard painters and several poetical effusions. He greatly enlarged and improved the Brera museum and Ambrosian library, and in the latter was placed a monument to him, with a bass relief and a colossal bust by Canova, executed by order of the academy. He was regarded as one of the most eminent painters of the modern Lombard school.

BOSSI, Giuseppe Carlo Aurelio, baron de, an Italian poet and diplomatist, born in Turin, Nov. 15, 1758, died in Paris, Jan. 20, 1823. The son of a Sardinian count, he acquired the title of baron in the French service. He produced several plays in his youth, studied law, and after a short banishment in 1781 was employed in the foreign ministry and in diplomacy. He was Sardinian minister plenipotentiary in St. Petersburg in 1797, when Paul I. on hearing of the Sardinian-French treaty sent him his passports, after which he became very prominent as envoy to Napoleon, and finally, with Carlo Giulio and Carlo Botta, was one of the three administrators or triumvirs of Sardinia (called in France the three Charleses) during the unsettled period preceding the annexation to France. He joined the French service in 1805, and became prefect of the department of Ain, and afterward of La Manche. His devotion to the emperor during the hundred days caused him to be removed from office after the second restoration. It was mainly due to his influence that England, supported by Prussia, successfully interfered in Sardinia in behalf of the Waldenses. He was the first to give a dramatic fervor after the manner of Pindar to the Italian ode.

Among his lyrics, which have been collected in 3 volumes (Paris, 1799-1801; 2d ed., London, 1816), are *L'Indipendenza americana* (1785), *La Olanda pacificata* (in two cantos, 1788), and *Oromasia* (on the French revolution, 12 cantos, 1805-'12).

BOSSI, Luigi, count, an Italian historian and archæologist, born in Milan, Feb. 28, 1758, died there, April 10, 1835. He studied jurisprudence and natural sciences in Pavia, and became Bonaparte's agent in Turin, and after the annexation of Sardinia to France keeper of the Italian archives. He was the author of over 80 works on archæological, scientific, and historical subjects, including *Storia della Spagna* (8 vols., 1821), *Istoria d'Italia* (19 vols., 1819-'28), *Introduzione allo studio delle arti del disegno*, and a volume of dramas, besides contributions to periodicals and academical annals. He also published an elaborate edition in Italian of Roscoe's "Life of Leo X." (12 vols., Milan, 1816-'17).

BOSSIERE, a N. W. parish of Louisiana, bordering on Arkansas, bounded E. and S. E. by Dauchite river and Bistineau lake, and S. W. and W. by Red river; area, 1,066 sq. m.; pop. in 1870, 12,675, of whom 3,505 were colored. Bateau lake is in this parish. The chief productions in 1870 were 287,660 bushels of Indian corn, 11,422 of sweet potatoes, and 13,506 bales of cotton. There were 1,553 horses, 1,564 mules and asses, 2,788 milch cows, 4,401 other cattle, 1,917 sheep, and 9,994 swine. Capital, Bellevue.

BOSSUET, Jacques Bénigne, a French prelate, born at Dijon, Sept. 27, 1627, died in Paris, April 12, 1704. He came of a family of lawyers, received his early education at the Jesuit college of Dijon, and thence was removed to the college of Navarre in Paris, where he soon attracted attention by his rapid progress in learning and his eloquence. It was said that he had formed a matrimonial engagement with Mlle. des Vieux, but that it was broken off in order that he might enter the church, though they never ceased to be friends, and he eventually provided her with a country seat near Paris, where she spent the rest of her life, prolonged till nearly her 100th year. He was ordained in 1652, spent some time under the influence of St. Vincent de Paul at Saint Lazare, declined the directorship of the college of Navarre (which he assumed, however, at a later period), and accepted the modest office of canon at Metz, relieving his arduous life of study and controversy with the Protestants by preaching occasionally in Paris. The sermons which he delivered there in 1659 created a deep impression. He never repeated a sermon, and spoke with little preparation excepting a rough draft of the leading points of his discourse. His style was picturesque, dramatic, and at times abrupt; the flow of his language was easy, and his presence was magnetic. For many years, and especially from 1660 to 1669, he was frequently summoned to Paris to preach the Lent and Advent series, and for occasional solemnities.

ties, addressing larger congregations and with greater effect than any other pulpit orator in that capital. Among his eulogies of saints, that of St. Paul is his masterpiece. He especially excelled in funeral orations, though he was too much inclined to idealize the subjects of his panegyrics. The most admired were those on Henrietta Maria, widow of Charles I.; on the great Condé; on Anne, princess Palatine; and above all, on the duchess of Orleans, whose misfortunes and whose mysterious death lent additional interest to his discourse. The oration which he delivered on the duchess de la Vallière's taking the veil was another of his fine efforts. In 1669 he received the bishopric of Condom, but he never entered upon its duties, and relinquished the title and revenues in 1670, when Louis XIV. intrusted to him the education of the dauphin. For the special instruction of his pupil he wrote his *Discours sur l'histoire universelle, De la connaissance de Dieu et de soi-même, et La politique tirée des propres paroles de l'Écriture Sainte*; the first showing the omnipresence of God in history, the second applying religious principles to philosophy according to the ideas of Descartes, and the third sustaining absolutism in politics. His *Exposition de la foi catholique*, said to have been written (1671) especially for the conversion of Turenne, weaned the latter and other eminent persons from the Reformed church. This work, translated into many languages, was sanctioned by two papal briefs (1678-'9), and by the Gallican clergy in 1682, and finally gave rise to the memorable conference between Bossuet and the Protestant divine Claude. In 1671 he was admitted to the academy; and having finished the education of the dauphin, he was named almoner of the duchess of Burgundy, and in 1681 bishop of Meaux. In 1682, in his opening address at the extraordinary convocation of the Gallican clergy, he attempted to reconcile his devotion to the absolute power of the king with that to the holy see, proclaiming the "indefectibility" of the latter, while contesting the infallibility of the pope personally. His influence resulted in the adoption of the four celebrated articles of the Gallican church. The fourth article, claiming that, "although the pope had the principal voice in matters of faith, his decisions were still not irrevocable, at least if they were not confirmed by the consent of the church," was regarded as an attack upon the supremacy of the pope, and exposed him to charges of heresy. His *Histoire des variations des Églises protestantes* (2 vols.), first published in 1688, though circulated in MS. since 1685, is his most important controversial work. He strenuously denounced the quietism of his friend Madame Guyon, as well as of his former disciple Fénelon, in his *Relation du Quétisme*, and procured the latter's removal from court and the condemnation at Rome of his *Maximes des saints*. Though he was in friendly and protracted correspondence with Leibnitz (1691-

1700) on the subject of a treaty for the union of the Reformed and Catholic churches, and though his biographer, Cardinal de Bausset, claims for him the gratitude of Protestants, it is uncertain whether he did or did not countenance the revocation of the edict of Nantes, and the subsequent persecutions of the Protestants. His activity was prodigious; he attended to the affairs of his diocese and to his duties at the court, while engaged in controversies, in writing and preaching, and in works of charity and piety. The last two years of his life were spent in comparative retirement owing to a painful disease (the gravel) from which he died. He was called by La Bruyère one of the fathers of the church, and by Henri Martin the Corneille of the pulpit, but was more generally known as the eagle of Meaux. He left an immense correspondence, including that with Leibnitz. Among his works not yet mentioned are his *Maximes sur la comédie*, condemnatory of theatres, and *Commentaire sur l'Apocalypse*, which he interprets as predicting the fall of the Roman empire. There are many more or less complete editions of his writings, and several new and complete ones are in progress. The oldest is that of 1747-'53, in 20 vols. Those of 1825 (60 vols. 12mo) and of 1835-'7 (12 vols. large 8vo) are regarded as among the best. The edition prepared by the Benedictines in 48 vols. (1815 *et seq.*) includes the *Histoire de Bossuet* (4 vols., Paris, 1814), by Cardinal Louis François de Bausset, who was also the biographer of Fénelon. Among his other biographers in France was Burigny (Paris, 1761), and in England, Charles Butler (London, 1812). The best biography is the *Histoire de J. B. Bossuet et de ses œuvres*, by Réaume (1 vol., Paris, 1869). New light is thrown upon his life and achievements by the *Mémoires et Journal sur la vie et les ouvrages de Bossuet* (Paris, 1856-'7), after autograph MSS., edited by the abbé Guettée, with an introduction and annotations of the abbé Le Dieu, who was Bossuet's secretary from 1699 to 1704. They represent Bossuet as genial in his manners, and always preserving his serenity of temper, excepting in his animosity against Fénelon.

BOSSUT, Charles, a French mathematician, born at Tarare, Aug. 11, 1780, died Jan. 14, 1814. He studied under D'Alembert, became his collaborator in the *Encyclopédie*, and was admitted to the academy in 1768, after which the king founded for him a chair of hydrodynamics. He published *Mécanique en général, Cours complet des mathématiques*, and *Essai sur l'histoire générale des mathématiques*. The last, published in 1802, was his masterpiece. He wrote also on navigation, astronomy, physics, and history, and prepared an edition of Pascal's works, with an essay on his life and writings.

BOSTAN, or **Al-Bostan** (Arab., the garden), a town of Asiatic Turkey, on the Sihun (Sarus), and on the N. side of Mount Taurus, 40 m. N. W. of Marash; pop. about 9,000. It is situated in a well watered and well cultivated

plain, whence its name. It contains several mosques, is surrounded by many villages dependent upon its authority, and trades extensively in wheat with the Turkomans. It is generally supposed that Bostan is on or near the site of the ancient Cappadocian city of Comana.

BOSTON, a game played by four persons, with two packs of cards. The cards are never shuffled; one of the packs is dealt, and the other cut alternately to determine the trump. The dealer gives five cards to each player twice, and three the last time around. If the first player can make five tricks, he says, "I go Boston;" and his competitors may overbid him by saying, "I go 6, 7, 8, 9, 10, 11, 12, or 13," as the hand of each may warrant. Should either of them fail to make the number of tricks he "bids" for, he must pay to each competitor a forfeit regulated by a card of prices prepared beforehand. Boston is the most complicated of all games of cards. It is said to have been introduced into France by Franklin, and was called after his native city.

BOSTON, the capital of the commonwealth of Massachusetts and of Suffolk county, the chief city of New England, and the seventh of the United States in point of population, situated in lat. 42° 21' 24" N., lon. 71° 8' 58" W., at the western extremity of Massachusetts bay. The city embraces Boston proper, East Boston, South Boston, Roxbury, and Dorchester. Boston proper, or old Boston, occupies a peninsula, joined to the mainland on the south by a narrow strip of land known as the Neck, which was once overflowed by the tide, but has been raised and widened. The surface is very uneven, and originally presented three hills, Beacon, Copp's, and Fort (whence the early name of the peninsula, Trimountain), the first of which is about 180 ft. above the sea. Fort hill has recently been levelled, while the elevation of Copp's hill has been much reduced. East Boston occupies the W. portion of the island formerly known as Noddle's island, but more commonly bearing the name of Maverick, from Samuel Maverick, who lived there in 1680. It is equidistant from old Boston and Charlestown, and has a hilly surface. South Boston extends about 2 m. along the S. side of the harbor, an arm of which separates it from Boston proper. Near the centre are Dorchester heights, which attain an elevation of about 180 ft. above the ocean, and afford a fine view of the city, bay, and surrounding country. The surface of Roxbury and Dorchester in many places is rugged and hilly. The original limits of Boston embraced but 690 acres; 1,700 acres were acquired by the addition of South and East Boston, and by filling the surrounding flats; 2,100 by the annexation of Roxbury; 4,800 by the annexation of Dorchester; and 880 by filling flats in other places; making the present area 10,170 acres. The city is connected with Charlestown by the Charles river bridge, 1,508 ft. long, and the Warren bridge,

1,890 ft. long; and with Cambridge by the West Boston bridge, which crosses Charles river from Cambridge street, Boston, and is 2,756 ft. long, with a causeway of 8,432 ft. Craigie's bridge, 2,796 ft. long, extends from Leverett street to East Cambridge; from this bridge another, 1,820 ft. in length, extends to Prison point, Charlestown. South Boston is reached by the Federal street bridge, about 500 ft. long, and the South Boston bridge, 1,550 ft. long, extending from the Neck to South Boston. These bridges are all free. The Western avenue, or Milldam road, has been constructed upon a substantial dam across the Back bay from the foot of Beacon street to Sewall's point, in Brookline. It is about 1½ m. long, from 60 to 100 ft. wide, and is a popular resort for driving. Boston is unsurpassed in the beauty of its suburbs, which embrace the cities of Charlestown, Chelsea, Somerville, and Cambridge, and the towns of Revere, Brighton, Brookline, Winthrop, and others. These places contain many handsome residences of persons doing business in Boston.—The harbor is a spacious indentation of Massachusetts bay, the mouth of which lies between Point Alderton on Nantasket and Shirley in Chelsea. It embraces about 75 sq. m., and includes several arms, such as Dorchester bay, South Boston bay, and the embouchures of Charles, Mystic, and Neponset rivers. A part of Charles river is commonly known as the Back bay. There are more than 50 islands or islets in the harbor. Boston light stands on Lighthouse island. Its top is 98 ft. above the sea, and is fitted with a revolving light which can be seen at a distance of 16 m. Northerly from the lighthouse runs a chain of islands, rocks, and ledges, 8 m. long, to the Graves. George's island commands the open sea, and Fort Warren, a very strong fortification, is built on it, the island being national property. Castle island (so called from a fortress which was erected there in 1638, and which subsequently was rebuilt and called Castle William in honor of William III.) lies further up the harbor, and is the site of Fort Independence. Governor's island is a mile to the north of Castle island, and Fort Winthrop, an uncompleted fortification, stands there. This island passed into the possession of John Winthrop in 1682, and for a long time was known as "the governor's garden." It is still in the possession of the Winthrop family, except that portion of it which has been ceded to the national government. Long island, which also has a lighthouse, is large, and attempts have been made to render it a place of residence, but with little success. Deer island is now occupied by city institutions, and Rainsford island by state hospitals. On Thompson's island is the Boston asylum and farm school for indigent boys. The main entrance to the harbor is between Castle and Governor's islands; it is very narrow, and is defended by Forts Independence and Warren. Deer island, comprising 184 acres of upland and 84 acres of flats, Thomp-



View of Boston from the Harbor.

son's, Great Brewster (16 acres), Galloupe's (16 acres), and Apple islands (9½ acres) belong to the city.—The growth of Boston for two centuries was not rapid. There are no exact figures for her population during the first four generations of her existence. It is supposed to have been 7,000 at the close of the 17th century. In 1742 it was placed at 18,000, probably an exaggeration. In 1764-'5, during the administration of Gov. Bernard, the first colonial census was taken, and under it the population of Boston was returned at 15,520. Mr. Bancroft says the population was "about 16,000 of European origin" at the close of 1768; and Mr. Frothingham puts it at about 17,000 in 1774. If the returns under the census of 1764-'5 were correctly made, Boston was 40 years in doubling her population after that date. The revolution, and the troubles which followed it, retarded her growth. Down to 1790 Boston did not increase so fast in numbers as the colony, province, or state of which she was or is the capital. The population from that date is shown by the federal censuses as follows: 1790, 18,038; 1800, 24,937; 1810, 33,250; 1820, 43,298; 1830, 61,392; 1840, 93,383; 1850, 136,881; 1860, 177,840; 1870, 250,526. The increase during the last decade is largely due to the annexation of Roxbury in 1867, which now constitutes the 13th, 14th, and 15th wards, containing 34,772 inhabitants, and of Dorchester in 1869, now forming the 16th ward, with 12,259 inhabitants. The character of the population has much changed during the last 30 years. Formerly it contained but few foreigners. In 1870 there were 162,540 native, 87,986 foreign, 247,013 white, and 3,496 colored. Of the native population, 127,617 were born in Massachusetts; of the

foreign, 56,900 were natives of Ireland, 18,818 of British America, 5,978 of England, 5,606 of Germany, 1,795 of Scotland, and 615 of France. Of the total population, 17,487 over 10 years of age were unable to read and 23,420 over 10 years of age were unable to write; of the latter, 21,993 were foreign and 1,427 native-born.—The legal division of the city is into 16 wards, but usage has divided it into certain districts. North Boston, or "the North End," is the oldest part of the place, and still retains much of the irregular appearance that characterized it in colonial times. Many old buildings yet stand there, but change is steadily going on. The North End comprises the larger portion of the Boston which makes so grand a figure in our revolutionary history. West Boston is mostly new, and contains the "fashionable quarter" of the town. It lies between Canal street and the Common, and west of Tremont and Hanover streets. It contains many public edifices, among which are the state house, the city hall, and the building of the Boston Athenæum. Most of the houses are of brick or stone, and many are costly and elegant. It contains many historical sites. "The South End" included before the annexation all that part of Boston which lies to the south of Winter and Summer streets, and running to Roxbury, now known as Boston Highlands. South Boston was originally the N. E. part of the town of Dorchester, and was annexed to Boston in 1804, except Washington Village, which was annexed in 1855. It has increased rapidly, and its appearance is strikingly different from that of old Boston, being open, airy, and cheerful. It forms ward 12, and contains 19,880 inhabitants. East Boston dates from 1832. Together with the islands in the har-

bor, it forms ward 1, and contains 23,824 inhabitants. It is a place of much enterprise, and is united by the Grand Junction railroad with all the railroads that proceed from the city. The depot of the Grand Junction is connected with the wharves, which have great depth of water. The water frontage is almost 20,000 ft., and the wharves are the best in the city. Two lines of steamships for Liverpool have their berths there. Ship building is one of its most important branches of business. It has extensive elevators for transferring to vessels grain brought from the west in cars, and ample facilities for loading and unloading foreign steamers and for the reception and despatch of immigrants. During the six months ending with March, 1872, 14,558 cars with 139,187 tons of merchandise were received here, and 11,127 cars with 114,128 tons of freight were forwarded. During the same period more than 1,000,000 bushels of grain were received at the elevator, and 617,826 bushels were exported. A large portion of the city west of the Common, known as the Back Bay, consists of made land, and has already become the most beautiful and fashionable quarter. In 1852 the commonwealth began to fill in these flats, and the proceeds of sales of this made land up to January, 1872, amounted to \$3,591,514, and the total expenditure to \$1,547,220. About 500,000 feet of land still remain unsold, and it is expected that \$1,500,000 profit will be realized from the improvement. Extending westerly from the public garden through this district is Commonwealth avenue, which when completed will be $1\frac{1}{4}$ m. long with a width of 240 ft. Through the centre runs a long park with rows of trees, while on either side are wide driveways. Many of the finest churches in the city, as well as private residences, have recently been erected in this quarter; among the public buildings are those of the Boston society of natural history and the institute of technology. The streets here are wide, regularly laid out, and present a handsome appearance; but in the older parts of the city, especially in the North End and the West End, they are exceedingly irregular. Some are very short, many very narrow, and most of them very crooked. Great improvements, however, have been made in the older parts of Boston by widening and raising streets. The most important of these improvements were made in Tremont street, south of Boylston street, and in Hanover and Devonshire streets. After the great fire of 1872 the streets burned over were improved by widening and straightening. The principal thoroughfare for general retail stores is Washington street, which extends S. W. in a very irregular line from Cornhill to Roxbury, a distance of more than 2 m. An ordinance has been passed for its extension northerly. The district bounded by State, Court, Tremont, Boylston, and Essex streets may be regarded as the business section of the city. The finan-

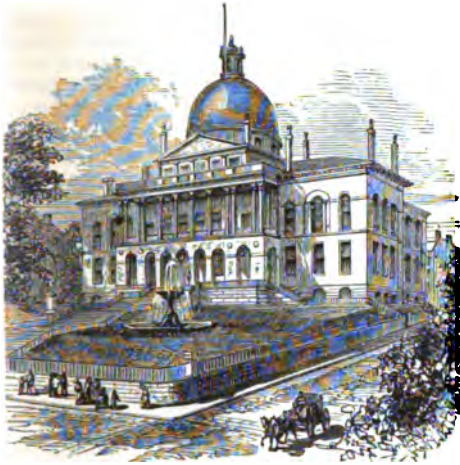
cial centre is State street, the headquarters of the bankers and brokers. Pearl street has been the largest boot and shoe market in the world, while Franklin, Chauncey, Summer, and the neighboring streets are noted for the great establishments that make Boston the leading market of the country for American dry goods. Boston has 120 hotels, 13 markets, 70 public halls, and 16 free public baths, of which 5 are for females. Gas is furnished by 7 gas companies, and the streets are lighted by 5,505 gas and 1,192 oil lamps. The city in 1872 contained 27,457 dwelling houses, 2,670 stores, and 2,690 miscellaneous buildings. There are 257,568,851 square feet of vacant land applicable to building purposes, valued at \$31,546,800, and 78,061,539 square feet of marsh land and flats, valued at \$2,680,100.—The most celebrated public building is Faneuil hall, the "cradle of liberty," in Dock square, which has a his-



Faneuil Hall.

torical reputation, because of the meetings of the revolutionary patriots that were there held. Most of the Boston political meetings are held in it now, when they are meant to be of a comprehensive character. The building was erected in 1742 by Peter Faneuil, a gentleman of Huguenot descent, and by him given to the town. It was nearly destroyed by fire in 1761. Rebuilt, and enlarged in 1806, it now covers nearly twice its first area. The hall is 76 ft. square and 28 ft. high. It is adorned with portraits of eminent Americans, conspicuous among which is an original one of Washington by Stuart. Among the other paintings are a full length of Peter Faneuil (a copy), Healy's picture of Webster replying to Hayne, and portraits of Samuel Adams, John Quincy Adams, Edward Everett, Abraham Lincoln, and John A. Andrew. The room over the hall is used by military companies for drill. The basement, which formerly was a market, is now a series of stores. The state house, in Beacon

street, near the centre of the city, with its dome 50 ft. in diameter and 30 ft. high, 110 ft. above the hill on which it stands and 230 ft. above the water of the harbor, is the most



State House.

conspicuous edifice in Boston. It was commenced in 1793, when Samuel Adams was governor, and was finished and occupied in January, 1798. Its form is oblong, 173 ft. front by 61 deep. The land was purchased by the city of Boston of the Hancock family, and given to the state. It was then known as "Gov. Hancock's pasture." The view from the dome is very fine, as it includes the harbor with the ocean beyond, an immense extent of country in various directions, covered with towns and villages, and the Blue hills of Milton. The hall of the house of representatives, the senate chamber, the rooms of the governor and council, the offices of the secretary of state, state treasurer, adjutant general, and auditor, and the state library, together with some minor offices, are in the state house. Large additions have been made to the state house since 1852, for the accommodation of the government; in 1866-'7 it was remodelled inside. On the terrace in front of the state house are statues of Daniel Webster and Horace Mann. In the Doric hall, or rotunda, is a statue of Washington by Chantrey, placed there in 1828 by the Washington monument association. Here are also the battle flags borne by Massachusetts soldiers during the civil war, copies of the tombstones of the Washington family in Brighton parish, England, a statue of Gov. Andrew, busts of Samuel Adams, Abraham Lincoln, and Charles Sumner, and many historical relics. The old state house was erected in 1748, and was for half a century the seat of government, being the building which is of such frequent mention in the revolutionary history. It is in Washington street, at the head of State street, dividing the latter, and

obstructing a beautiful view. It has long been devoted to business purposes, having been entirely remodelled. One of the most imposing specimens of architecture in the city is the city hall in School street. It covers 13,927 square feet, is built of the finest Concord granite in the Italian renaissance style with modern French modifications, and is surmounted with a Louvre dome. It was completed in 1865 at a cost of \$505,691. The city officials have commodious quarters here, while in the dome is the central point of the fire-alarm telegraphs. On the lawn in front of the city hall stands the bronze statue of Franklin by Greenough. The new post office, in Milk, Water, and Devonshire streets, the corner stone of which was laid Oct. 16, 1871, will be when completed the finest building in New England. Its architecture is of the most ornate character. It will be of the finest granite, four stories high, with a frontage of over 200 ft. in Devonshire street. Its cost will exceed \$2,000,000. The upper stories will be occupied by the United States sub-treasury. The post office was in the merchants' exchange in State street until the fire of 1872, when it was removed temporarily to Faneuil hall. The exchange, completed in 1842, at a cost, exclusive of the land, of \$175,000, was noted for its large size and massive architecture; but in consequence of the damage then received, it was decided to remodel it. The custom house is a large and costly granite edifice in State street, and was 12 years in building, 1837-'49, at an expense of \$1,076,000. It is of the Doric order, and is 140 ft. long from N. to S., 95 ft. through the centre, and 75 ft. at the ends. The form is that of a Greek cross. The porticos are 67 ft. long, and project 10 ft. on each side. They comprise 32 Doric columns, each 32 ft. high with a diameter of 5 ft. 2 in. The building is surmounted by a dome, the top of which is 90 ft. from the ground. The court house, also of granite, is in Court square. The state and municipal courts are held here, while the old Masonic temple in Tremont street is devoted to the use of the United States courts. The Suffolk county jail, in Charles near Cambridge street, completed in 1849, is 70 ft. square and 85 ft. high, with four wings. The exterior is of Quincy granite, and the remaining porticos are of brick, stone, and iron. No school building in the United States surpasses in general completeness that of the girls' high and normal school. It was completed in 1870 at a total cost of \$310,717, has a frontage of 144 ft. both on Newton and Pembroke streets, contains 66 separate apartments exclusive of halls, corridors, &c., and has accommodations for 1,225 pupils. The large hall in the upper story contains a valuable collection of casts of classical sculpture and statuary acquired by donations. Tremont Temple, in Tremont street, was erected in place of the building burned in 1852, which had been made from the Tremont theatre. The main hall is 124 ft. by 73, and is

50 ft. high, with galleries on three sides. Nearly all the concerts, lectures, fairs, readings, &c., given in Boston, occur in Tremont Temple, Horticultural hall, and the Music hall. In 1872-'3, 19 courses, embracing 205 lectures, were delivered in Boston. The Music hall, completed in 1852, is in the interior of a block, with entrances from Winter and Tremont streets. The main hall is 130 by 78 ft. and 65 ft. high, and has two tiers of galleries on three sides. It is adorned with Crawford's statue of Beethoven, a statue of the Apollo Belvedere, and three casts of eminent composers presented by Miss Charlotte Cushman. The great organ in the Music hall is the largest instrument of the kind in America, and ranks among the finest in the world. Its entire height is 60 ft., breadth 48 ft., depth 24 ft. It contains 5,474 pipes, of which 690 are in the pedal organ, and has 84 complete registers. It was constructed at Ludwigsburg in Germany, at a cost of \$80,000, by Walcker, the builder of the great organs of Ulm and Stuttgart, and was formally inaugurated Nov. 2, 1863. Horticultural hall, corner of Tremont and Bromfield streets, is a handsome structure of fine-grained white granite, beautifully dressed. The front is surmounted by a granite statue of Ceres, and is ornamented by statues of Flora and Pomona. The lower floor is occupied for business purposes, while the two halls are used by the Massachusetts horticultural society and for public lectures, fairs, concerts, &c. The Masonic temple, on the corner of Tremont and Boylston streets, a structure of fine light-colored granite, highly ornamental and unique in style, was completed in 1867. It has a front of 85 ft. in Tremont street, and is 90 ft. high, having seven stories above the basement, and, besides numerous smaller apartments, contains three large halls for masonic meetings. Odd Fellows' hall has lately been erected on the corner of Berkeley and Tremont streets. The building is of elegant design, constructed of Concord and Hallowell white granite, is four stories high, and covers 12,000 square feet. The hall of the Massachusetts charitable mechanics' association, constructed of dark freestone in a modification of the Italian renaissance style, at a cost, including land, of about \$320,000, is on the corner of Bedford and Chauncey streets. It is used by the Boston board of trade and the national board of trade. The depot of the Lowell railroad company will when completed be one of the largest and most ornamental railroad structures in the country. It will be of brick, with trimmings of Nova Scotia freestone, and will be 700 ft. long, with a front of 205 ft. in Causeway street. The train house will be spanned by an arch of 120 ft. without central support. Faneuil Hall market, popularly known as Quincy market, situated just E. of Faneuil hall, was completed in 1827 at a cost of \$150,000. It is of Quincy granite, 530 ft. by 50, and is two stories high. Washington market was erected in 1870 for the accommodation of the South

End, on the corner of Washington and Lenox streets. It is 250 ft. long, 120 ft. wide, and contains nearly 100 stalls. Among the most ornamental of the private edifices may be mentioned the "Sears building," corner of Court and Washington streets, constructed of gray and white marble in the Italian-Gothic style, at a cost, including land, of about \$750,000, and devoted exclusively to offices, banks, &c.; and the hotel Boylston, containing apartments for families, recently erected on the corner of Tremont and Boylston streets.—Boston contains 25 public parks and squares. The principal one, Boston Common, is a park of 48 acres, surrounded by an iron fence, erected in 1886 at a cost of more than \$100,000. The Common is considered to date from 1634, and by the city charter it is made public property for ever, and the city cannot sell it or change its character. The malls are spacious and shaded by magnificent trees, some of which were set out considerably more than a century ago. There are nearly 1,300 trees on the Common, which are kept in admirable order at a large annual expense. The "old elm" is regarded as the oldest tree in New England; it is represented on a map engraved in 1722, and is supposed to be as old as Boston itself. In the great branch broken off by the gale of 1860 nearly 200 rings could be easily counted. It was also mutilated by a high wind in 1869, and is now protected by strong iron bands and props, and an iron fence. One of the most conspicuous objects on the Common is a costly bronze fountain, known as the Brewer fountain, cast in Paris and set up at the expense of Gardner Brewer. The foundation for a soldiers' monument has been laid on Flagstaff hill, near the centre of the Common. The public garden, which was once a portion of the Common, is now separated from it by a part of Charles street. It comprises 21½ acres beautifully laid out, and contains a conservatory, an equestrian statue of Washington by Ball, a bronze statue of Edward Everett by Story, one representing Venus rising from the sea, and a monument to commemorate the discovery of ether as an anæsthetic. Besides the public statues already mentioned, there is one of Alexander Hamilton in Commonwealth avenue, and two in Louisburg square, respectively representing Aristides and Columbus.—Five city passenger railway companies have lines extending to all parts of the city and suburbs, and there is an omnibus line from Concord street to Charlestown. There are two ferries to East Boston—North ferry, from Battery street to Border street, and South ferry, from Eastern avenue to Lewis street. Communication with Chelsea is by the Winnisimmet ferry, popularly known as Chelsea ferry, established in 1631, and believed to be the oldest ferry in the United States. Eight lines of railroad terminate in Boston, viz.: the Fitchburg, the Eastern, the Boston, Lowell, and Nashua, the Boston and Maine, the Boston and Provi-

dence, the Boston, Hartford, and Erie, the Boston and Albany, and the Old Colony and Newport. By means of the Grand Junction railroad, the main line of the Boston and Albany is connected with the Fitchburg, Lowell, Eastern, and Boston and Maine railroads, and with the Grand Junction wharf at East Boston, which greatly facilitates the transfer of freight to and from vessels. There are numerous lines of steamers to the principal eastern ports of the United States and British America, while two lines ply between Boston and Liverpool. The harbor has 164 wharves, and will afford anchorage for 500 vessels of the largest class.—Boston early became distinguished for her commerce. In less than half a century after the foundation of the place, the Boston merchants traded not only with other parts of America and the leading nations of Europe, but with the Canaries, the coast of Africa, and Madagascar. Their wealth was the subject of remark to all visitors. The first vessel belonging to Boston, of American build, was the bark *Blessing of the Bay*, built at Mystic for Gov. Winthrop, and launched July 4, 1631. She was of 80 tons, and her first voyage was to Long Island and New York. The first ship built at Boston was the *Trial*, in 1644, which immediately made a voyage to Spain. The same year a fur company composed of Boston merchants was formed. During the year ending Dec. 25, 1748, 480 vessels entered the port, and 540 were cleared. A century earlier the arrivals of ships were only about one a month, but even then large quantities of country produce were exported, 20,000 bushels of corn being mentioned among the exports of 1645. After the revolution Boston rapidly attained to eminence in commerce. The number of foreign arrivals was 899 in 1791, and 2,985 in 1857. In 1806 it was 1,083, and but 83 in 1814, the last year of the second war with England. In 1871 Boston ranked next to New York in extent of imports, and third among the cities of the Union in the value of foreign commerce, New York being first and New Orleans second. The total value of the commerce for the year ending June 30, 1871, was \$68,068,914, the imports being \$33,652,225, domestic exports \$12,761,291, foreign exports \$1,450,398; 671 American vessels of 266,673 tons, and 2,843 foreign vessels of 569,431 tons, entered from foreign ports; and 566 American vessels of 205,775 tons, and 2,723 foreign vessels of 896,778 tons, cleared for foreign ports; 41 American and 85 foreign ocean steamers entered, and 40 American and 28 foreign cleared; 788 steamers and 468 sailing vessels entered in the coastwise trade, and 868 steamers and 1,207 sailing vessels cleared. There were belonging to the port 876 sailing vessels, with an aggregate tonnage of 315,966, and 57 steamers with a tonnage of 22,820; 166 vessels of 5,360 tons were employed in cod and mackerel fishing; 25 vessels of 4,732 tons were built during the

year. The imports from England amounted to \$22,941,579, and the exports to that country were \$4,127,916; imports from British America, \$2,189,473, exports \$2,896,827; imports from British India, \$4,206,474, exports \$285,523; imports from Cuba and Porto Rico, \$7,325,512, exports \$992,784; imports from Brazil, \$1,042,000; from China, \$1,958,066; from the Argentine Republic, \$1,902,752; from Italy, \$1,740,607; from Sweden and Norway, \$1,150,070; exports to Chili, \$838,287. The leading articles imported, with their values, were: brown sugar, \$7,329,133; hides and skins (not fur), \$3,158,524; dress goods, \$2,188,451; bar iron, \$1,962,116; cloths and cassimeres, \$1,864,289; molasses, \$1,627,502; fruits and nuts, \$1,849,858; raw hemp, \$1,201,148; rags, \$854,369; coffee, \$698,729; earthen, stone, and china ware, \$672,837; indigo, \$594,338; spices, \$400,000; wool, \$372,115; tea, \$245,882. The chief articles of export were: flour, \$1,467,748; bacon and hams, \$653,501; petroleum, \$529,470; household furniture, \$301,569; ice, 49,085 tons, valued at \$202,452. The ice trade is a Boston invention. It was originated by Frederick Tudor, who in 1806 shipped 180 tons to Martinique. For 20 years the losses were great, but success was finally won by talent and perseverance. Mr. Tudor had a monopoly of the trade for 30 years, when, its brilliant success having become known to all, he found competitors. It is believed that but for the ice trade the Calcutta trade of Boston never could have become important. Formerly this trade was very large, but it has within a few years considerably declined. Boston is the only city on the eastern seaboard in which no capitation tax is levied upon immigrants. This impost in other cities varies from \$1 50 to \$2 50 on each passenger. The number of arrivals in 1871 was 22,904; in 1870, 80,069; in 1869, 26,414; in 1868, 15,128. The domestic trade of Boston is especially large in boots and shoes, wool, cotton, dry goods, clothing, fish, flour, and grain. The annual sales of merchandise are estimated at \$1,200,000,000. The receipts of wool embrace about one third the entire clip of the country, while the average weekly sales amount to about 1,000,000 lbs. The imports of foreign wool for a series of years, as compared with the imports into New York, are as follows:

YEARS.	BOSTON. lbs.	NEW YORK. lbs.
1868.....	17,871,813	47,571,920
1864.....	20,750,124	51,591,879
1865.....	14,292,412	82,561,530
1866.....	30,037,935	86,066,176
1867.....	12,675,980	19,838,369
1868.....	10,873,791	13,456,085
1869.....	19,954,682	21,570,480
1870.....	15,721,147	12,460,280
1871.....	83,098,521	89,411,518

The stock of foreign wool on hand in Boston Jan. 1, 1872, was 2,846,800 lbs.; 1871, 2,052,000 lbs.; 1870, 4,550,000 lbs.; 1869, 2,840,000 lbs.; 1868, 5,155,000 lbs.; 1867, 5,435,000 lbs. The amount of domestic wool on hand Jan. 1, for a

series of years, in the three leading wool markets of the country, was as follows:

YEARS.	BOSTON. lbs.	NEW YORK. lbs.	PHILADELPHIA. lbs.
1863.....	7,400,000	6,100,000	3,000,000
1869.....	11,350,000	11,300,000	5,500,000
1870.....	8,900,000	8,780,000	3,900,000
1871.....	6,725,000	7,070,000	4,779,000
1872.....	7,100,000	6,814,000	2,702,000

The receipts of cotton in 1871 were 318,000 bales, all of which, excepting about 8,000 bales exported, was for consumption in the manufacturing towns of New England. The number and value of packages of domestic dry goods exported from the city has been:

YEARS.	Packages.	Value.
1862.....	2,065	\$361,193
1863.....	438	55,447
1864.....	245	42,217
1865.....	341	58,354
1866.....	4,746	670,285
1867.....	10,823	1,084,966
1868.....	11,943	1,298,242
1869.....	6,665	720,384
1870.....	7,436	785,865
1871.....	11,264	979,659

The hides received in 1871 were valued at \$14,800,000; 1870, \$11,885,000; 1869, \$18,225,000; 1868, \$11,500,000. The value of the leather manufactured for the Boston market in 1871 was \$86,900,000, against \$88,038,574 in 1870; and the whole amount of sales for the year was \$53,479,000, against \$47,881,991 in 1870. The aggregate sales of boots and shoes for 1871 amounted to \$64,500,000, and for 1870 to \$63,188,255. In 1871 1,251,223 cases of boots and shoes (average value, \$66 75 per case) were shipped from the city; in 1870, 1,213,129 cases; in 1869, 1,182,704; in 1868, 1,041,472. The receipts of fish in 1871 amounted to \$4,199,872. The elevators of Boston have a capacity for 1,000,000 bushels of grain. During the year ending March 1, 1872, there were received 1,408,325 barrels of flour, 4,179,911 bushels of corn, 475,500 bushels of wheat, and 2,431,272 bushels of oats, a large portion of which was for foreign exportation.—According to the latest returns of the industry of Massachusetts, the chief manufacturing establishments of Boston were 49 cabinet ware factories, 88 manufacturing of machinery, 88 book-publishing houses, 89 printing establishments, 31 hat and cap factories, 30 bookbinderies, 29 manufacturing of watches, 28 of cars, carriages, &c., 17 of pianos, 17 of upholstery, 12 brass and 7 type and stereotype foundries, 9 glass factories, 4 of organs, melodeons, and harmoniums, 4 of paper collars, 3 of sewing machines, and 2 of chemicals.—There are 51 national banks in Boston, with an aggregate capital of \$49,400,000. The number of savings banks in 1871 was 16, with a total of 180,480 depositors, and deposits aggregating \$49,944,206. The two most extensive were the five-cent savings bank, which had 58,568 depositors and deposits amounting to \$9,984,068, and the provident institution for savings, with 83,528 depositors and deposits reaching \$12,405,954. In 1872 there were 37 insurance

companies, of which 6 were life, with a combined capital of \$28,682,778; while 92 insurance companies belonging to other cities had agencies in Boston.—The government is vested in a mayor (salary \$5,000), elected annually on the second Monday in December, a board of 12 aldermen, and a common council of 64 members, 4 from each ward. The police are appointed by the mayor and aldermen, and are under the immediate direction of the mayor and a police committee. There are 11 police districts, a chief, 11 captains, and 11 lieutenants. The maximum number of the police force is 500, of whom 60 are officers. In 1871, 10,837 disturbances were suppressed and 25,201 arrests made, 17,794 of foreigners; 15,089 arrests were for drunkenness, 2,213 for assault, 1,372 for larceny, 98 for robbery, 18 for house breaking, and 8 for murder. The amount of property reported stolen was \$60,018; amount recovered, stolen in and out of the city, \$71,159; fines imposed, \$60,370. There were 2,952 places where intoxicating drinks were sold—1,428 groceries, &c., 1,121 bar-rooms, 327 jug rooms, and 76 hotels. The whole number of persons taken into custody by the police was 17,107, of whom 15,089 were taken to the stations, and 2,018 were taken home. The fire department comprises a chief, 14 assistant engineers, and a secretary, all elected annually by the city council, and 450 members; their aggregate salaries amount to \$215,163. They are divided into 21 steam engine companies, 10 hose companies, and 7 hook and ladder companies. About 46,000 feet of hose are used, and there are 2,375 hydrants and 96 reservoirs where water can be obtained in case of fire. The number of fires in 1871 was 549; the losses by fire amounted to \$704,329, being \$297,722 on buildings and \$406,606 on stock; total insurance, \$534,991—\$168,757 on buildings and \$366,234 on stock. The fire-alarm telegraph is in charge of a superintendent and a corps of operators, who keep constant watch at the city hall day and night. Here is the central office to which alarms are transmitted from the signal stations or boxes, of which there are 146. From this office 42 bells and 55 gongs at their various locations on churches, school houses, engine houses, &c., are struck precisely at noon every day.—Boston long felt the want of a supply of water, but it was not till 1848, during the mayoralty of Josiah Quincy, jr., that the want was met, and water brought from Lake Cochituate, 20 m. W. of Boston. The lake covers 650 acres, and drains some 14,400 acres. Water is conveyed by a brick conduit 11 m. long to a grand reservoir in Brookline, and thence to distributing reservoirs in Boston, East Boston, South Boston, and the Highlands. Brookline reservoir covers about 28 acres, and has a capacity of nearly 120,000,000 gallons. The Chestnut Hill reservoir has just been completed at a cost of \$2,423,231. It is situated in the towns of Brighton and Newton, 5 m. from the Boston city hall and 1 m. from the

Brookline reservoir, covers about 125 acres, and has two basins with an aggregate capacity of 730,000,000 gallons. It is surrounded by a beautiful driveway, varying from 60 to 80 ft. in width, which cost \$169,471, and is a fashionable resort. Authority has lately been given to the city to take water from the Sudbury river, which will be connected with the reservoirs by independent mains. An important improvement was made in the Cochituate water works in 1869, by the construction of a stand-pipe in Roxbury, by means of which pure water is forced to the highest levels occupied by dwelling houses throughout the city. The base of the shaft is 158 ft. above tide level; the interior pipe is a cylinder of boiler iron 80 ft. long. The total cost was about \$100,000. Its capacity is adequate to the supply of the whole city; hence the reservoir on Beacon hill is no longer used. The gross payments for constructing, carrying on, and extending the Cochituate water works, from their commencement, Aug. 20, 1846, to April 30, 1871, amount to \$19,087,530; total income, \$9,867,633.—The total debt of the city at the close of 1871 was \$29,883,390, of which \$27,865,916 was funded and \$1,517,473 unfunded. This was classified as follows:

City debt proper.....	\$17,020,488 88
Water debt (net cost of works).....	9,570,896 64
War loans (outstanding).....	1,915,500 00
Roxbury loans (outstanding).....	692,000 00
Dorchester loans (outstanding).....	154,500 00
Total.....	\$29,883,390 52

The means on hand for the payment of this debt, Dec. 30, 1871, were funds in the hands of the board of commissioners of the sinking fund, amounting to \$10,771,231, and public land and other bonds in the city treasury pledged for the payment of the debt, amounting to \$998,930; total, \$11,770,162. Immediately after the great fire of 1872, the legislature authorized the city government to issue bonds to the amount of \$20,000,000 to meet the exigencies caused by the fire. The total receipts into the city treasury on account of the city for the year ending April 30, 1871, amounted to \$20,773,594; expenditures, \$19,320,382. The chief items were:

	Expenses.	Income.
City hospital.....	\$101,290	\$5,686
Fire department.....	418,507	8,810
Health department.....	298,992	43,998
Police department.....	578,844	11,525
Public buildings.....	63,815	25,278
Public institutions.....	390,067	114,179
Schools and school houses.....	1,675,279	23,800
Streets.....	1,436,278	167,776
Water works.....	1,590,043	789,123

The whole amount of taxes assessed for the year 1870 was \$9,050,419, of which \$8,936,567 was assessed on real and personal estate, and \$118,852 on 56,926 polls. Of the whole amount, \$7,972,820 (\$13 65 per \$1,000) was for city and county, and \$963,747 (\$1 65 per \$1,000) for state purposes. The valuation and rate of tax for a series of years are as follows:

YEARS.	Real estate.	Personal estate.	Total valuation.	Rate per \$1,000.
1800....	\$6,901,000	\$3,194,700	\$10,095,700	.....
1820....	21,687,000	16,602,200	38,289,200	\$4 00
1840....	39,960,000	22,626,000	62,586,000	4 05
1840....	60,424,200	34,157,400	94,581,600	5 50
1850....	103,098,400	74,907,100	180,500,000	6 50
1860....	168,691,300	112,949,700	276,861,000	9 30
1861....	167,682,100	106,073,000	273,760,100	8 90
1862....	168,688,000	112,579,000	276,217,000	10 50
1868....	160,624,500	133,882,700	302,507,200	11 50
1864....	182,070,300	150,877,600	332,449,900	13 80
1865....	201,628,900	170,268,575	371,897,775	15 80
1866....	225,767,215	189,595,130	415,862,345	18 00
1867....	250,587,700	194,858,400	444,946,100	15 50
1868....	257,635,800	205,987,900	468,573,700	12 80
1869....	382,051,900	217,459,700	549,511,600	18 70
1870....	365,598,100	218,496,300	584,039,400	15 80

The tax rate per \$1,000 in 1870 was \$22 50 in New York, \$18 in Philadelphia, \$15 in Chicago, and \$31 60 in Cincinnati. In 1840 the average amount of property owned by each inhabitant of Boston was less than \$900; in 1870 it had increased to an average of more than \$2,300.—The benevolent institutions of Boston are numerous, and effective in their operations. There are 62 societies which come under this special head. The Perkins institute and Massachusetts asylum for the blind, though it is largely aided by the state, and is in part the work of other places, is of Boston origin, and has derived much of its means from the liberality of Boston people. It has been under the charge of Dr. S. G. Howe since its opening in 1832, and has received 776 pupils. The number of inmates in 1871 was 162; number of instructors and employees, 40; average annual receipts for five years, \$78,497; expenditure, \$71,842. Indigent persons are admitted gratuitously. The Massachusetts school for idiotic and feeble-minded youth, at South Boston, also under Dr. Howe, has been very successful. It was opened in 1848, since which time 465 pupils have been received, and there were 106 inmates in 1871. The eye and ear infirmary, exclusively for the poor, is in Charles street, and is provided with everything necessary for the efficient treatment of the sick. The building and land cost \$54,000. The city hospital, opened in 1864, covers nearly seven acres of land, occupying the entire square bounded by Concord, Albany, and Springfield streets, and Harrison avenue. It consists of a central building and three pavilions, two of which are connected with the central building by corridors. Many patients are received and treated at the expense of the city, while others pay for these privileges. In 1871, 2,569 patients were treated within the hospital, in addition to 8,899 out patients. The Massachusetts general hospital, incorporated in 1811, is at the corner of Allen and Blossom streets, occupying a plot of four acres. The building is of granite, and has a front of 274 ft. and a depth of 54 ft., with a portico of eight Ionic columns. The general fund of the hospital, Jan. 1, 1872, amounted to \$888,258; the income of the corporation for the preceding year was \$211,302, and the ex-

penses \$238,458. These figures include the statistics of the McLean asylum for the insane at Somerville, which is a branch of this institution. In 1871 more than 1,500 patients were received in the hospital, about two thirds free of charge, and nearly 10,000 out patients were treated. The consumptives' home is a spacious mansion surrounded with ample grounds, at the junction of Warren street and Blue Hill avenue, Dorchester. The institution is of recent origin. It was founded by Dr. Charles Cullis, and is supported by voluntary contributions, which in 1871 amounted to \$55,000. During that year 185 patients were cared for at the home, and 757 have been received since its opening. The Boston farm school, for the relief and instruction of poor boys destitute of proper control, is on Thompson's island, and has accommodation for about 300 boys. Among the other benevolent institutions that are doing much good are the Baldwin home for little wanderers, the home for aged indigent females, and two inebriate asylums, the Washingtonian home and the Greenwood institute. The public charitable institutions are under the care of a board of directors elected by the city council; they have charge of the house of industry and reformation and the almshouse, situated on Deer island, and the house of correction and lunatic hospital, at South Boston. The whole number of inmates in the first three institutions, April 30, 1871, was 1,062, of whom 398 were females; total expenditures for the year, \$111,212; income, \$25,948. There were 409 inmates of the house of correction and 233 of the lunatic hospital; expenditures of the former for the year, \$82,001; income, \$75,599; expenditures of the latter, \$64,441; income, \$5,676. Galloupe's island is used as a quarantine station and for a smallpox hospital.—The schools of Boston have a high reputation. According to the report of the superintendent for the year ending Aug. 31, 1871, the number of persons in the city of school age (from 5 to 15) was 45,970, of whom 38,220 were attending school. The average number belonging to the day schools was 36,174, with an average daily attendance of 33,464; and there were 1,666 in the evening schools, with an average attendance of 1,037. There were 5 high, 37 grammar, and 327 primary schools, 11 evening schools, a school for deaf mutes, a kindergarten school, and 2 schools for licensed minors (boys licensed to sell papers and serve as bootblacks on the streets), making a total of 384 schools. The whole number of teachers was 990, of whom 850 were females. The high schools are the Latin school for boys, the English high school for boys, the girls' high and normal school, and the Highland and Dorchester high schools for boys and girls. The first named is well known as a preparatory school to Harvard university; its object is "to give thorough general culture to boys intending to pursue the higher branches of learning, or preparing for professional life." Much time is devoted to

the study of the languages, ancient and modern. There is also an evening high school. Music and drawing are taught in all grades of the public schools. The total expenditure for school purposes during the year was \$1,575,279, of which \$1,131,599 was for current expenses and \$443,679 for school houses and lots. The institute of technology was founded in 1861, and is "devoted to the practical arts and sciences." It is in Boylston, between Berkeley and Clarendon streets. The building, an elegant structure of pressed brick with freestone trimmings, is 150 ft. long, 100 ft. wide, and 85 ft. high. The institute receives one third of the grant made by congress to the state for the establishment of a college of agriculture and the mechanic arts. Its plan of organization includes a society of arts, a museum of arts, and a school of industrial science and art. In 1871 there were 264 students, from 13 states, and 13 instructors. Boston college is a Jesuit institution, with 10 instructors and 140 pupils, organized in 1863. The Boston university was founded in 1869 by the munificence of Isaac Rich, who bequeathed for that purpose the bulk of his estate, amounting to nearly \$2,000,000. The plan of the institution comprehends a general department of schools, which supposes on the part of the student a previous collegiate training, and a department of colleges. The former will embrace schools of theology, law, medicine, and universal science; and the latter, colleges of arts, natural science, philosophy and literature, agriculture, mining and engineering, navigation and commerce, pharmacy, dentistry, music, architecture, and painting and sculpture. The school of theology, the school of law, and the college of music are already in operation. The first named, the largest theological school in New England, was formerly the Boston theological seminary (Methodist Episcopal), organized in 1847. In 1872 it had 14 instructors, 94 students, and a library of 4,000 volumes. The school of law was opened in October, 1872, with 50 students. The college of music is intended to afford instruction to pupils advanced in the study and practice of music. Boston has numerous music schools, the chief of which, besides the one already mentioned, are the New England conservatory of music, in Music hall, the Boston conservatory of music in Tremont street, opposite the Common, and the national college of music in Tremont Temple, organized in 1872. The medical school of Harvard university is situated in North Grove street. It was established in 1783, and in 1871 had 25 instructors, 301 students, and a library of 2,000 volumes. The dental school of Harvard university, with 13 instructors and 27 students, is also situated in Boston. The New England female medical college, established in 1848, in 1871 had 5 instructors and 26 pupils. The Massachusetts college of pharmacy was established in Boston in 1867. In educational and literary institutions Boston is not surpassed by

any city in the United States. The public library, next to the library of congress at Washington, is the largest in the country. Joshua Bates, a wealthy banker of London, whose early life was passed in Boston, having offered the city \$50,000 toward the purchase of books if a suitable building should be provided, his offer was accepted in 1852 and an edifice was erected in Boylston street, opposite the Common, which was completed and delivered to the trustees Jan. 1, 1858. The cost of the land and building was \$365,000. Abbott Lawrence gave \$10,000 and Jonathan Phillips \$30,000 to the institution. In 1858 the library (2,250 volumes) of Nathaniel Bowditch was presented by his sons, and in 1860 the valuable collection (11,721 volumes) of Theodore Parker was received by bequest. The increase of the library has been as follows:

YEARS.	Volumes.	Pamphlets.
1852.....	9,688	961
1855.....	23,089	12,836
1860.....	27,886	27,881
1865.....	180,673	84,566
1871.....	179,260	89,746
1872.....	192,966	100,858

In 1871 the library of congress had about 206,000 volumes, the Astor library 140,538, and the New York Mercantile library 127,237. The increase of the Boston public library in 1871 was the largest ever reported, being 18,000 volumes and nearly 15,000 pamphlets; during the same period the library of congress increased 12,441 volumes and 8,000 pamphlets, the New York Mercantile library 11,416 volumes, and the Astor library 1,500 volumes. In that year the library of Spanish and Portuguese books and manuscripts of the late George Ticknor, more than 4,000 in number, was added to the public library. In 1872 the number of persons using the library was 42,453, and the number of books issued 380,343. The expenditures amounted to \$74,924, of which \$67,000 was appropriated by the city. The library is free to all, and books may be taken away; a branch with 6,767 volumes (included in the above figures), is in operation in East Boston. In 1872 a branch with 4,365 volumes was opened in South Boston, and preparations were made for opening another in Roxbury.—The Boston Athenæum dates from 1804, its germ being the Anthology club. The association was incorporated in February, 1807. The beautiful building now used by the Athenæum was completed in 1849. It stands on the S. side of Beacon street, between Bowdoin and Somerset streets. Its length is 114 ft., and its breadth is irregular; the height is 60 ft. The material is freestone. The first story contains the sculpture gallery and two reading rooms. The library is in the second story, and the picture gallery in the third. The building cost \$136,000, and \$55,000 was paid for the land. The privilege of using the library, which contains about 95,000 volumes, is limited to the holders of about 1,000 shares, but strangers

may have access. The funds of the Athenæum amount to more than \$250,000, besides the real estate, library, paintings, and statuary, which are valued at upward of \$400,000. The chief benefactors of the institution are: James Perkins, who gave it a house on Pearl street, which was used as a library, &c., for 27 years, and then sold for \$45,000; John Bromfield, who bequeathed it \$25,000; Samuel Appleton, who bequeathed it \$25,000; James Perkins, jr., who gave it \$8,000; Thomas H. Perkins, who gave it \$8,000; and T. W. Ward, who gave it \$5,000. Many other persons have given or bequeathed lesser sums, or books, or articles for the picture and sculpture galleries. The American academy of arts and sciences, incorporated in 1780, has its rooms and its library (about 15,000 volumes) in the Athenæum building. The magnificent building of the Boston society of natural history (incorporated in 1831), recently constructed at a cost of \$100,000, is on the corner of Boylston and Berkeley streets. The library contains 12,000 volumes; the valuable cabinet is open to the public for several hours on Wednesdays and Saturdays. The Lowell institute was founded by John Lowell, jr., who bequeathed \$250,000 to provide regular courses of free lectures. The most important libraries, in addition to those already mentioned, are the libraries of the American Congregational association, with 6,500 volumes and a fund of \$168,000; the Boston library society, with 19,000 volumes; the Handel and Haydn society, with 8,000 volumes (music); the Massachusetts historical society, founded in 1791, with 18,500 volumes; the mechanic apprentices' library association, with 6,000 volumes; the social law library, with 8,000 volumes; the state library of 32,000 volumes; and the young men's Christian association, with 4,610 volumes. The mercantile library, founded in 1820, had about 20,000 volumes, which were destroyed in the great fire of 1872.—The press of Boston is the oldest in the United States. The first journal regularly published in North America was "The News Letter," which was commenced April 24, 1704, by John Campbell, postmaster. It was published 72 years, ceasing in 1776, with British rule. The second paper was the "Boston Gazette," commenced in 1719, of which James Franklin was printer. In 1721 Franklin commenced the publication of the "New England Courant." Benjamin Franklin was an apprentice to his brother, and wrote for the "Courant" at the age of 16. The paper was for some time published in Benjamin's name. There are now (1873) 143 periodicals published in Boston, of which 9 are daily, 6 semi-weekly, 61 weekly (4 German), 1 bi-weekly, 4 semi-monthly, 51 monthly, 2 bi-monthly, 8 quarterly, and 1 semi-annual.—There are 150 churches in Boston, classified as follows: Baptist, 17; Christian, 1; Church of Christ, 1; Church of the Adventists, 1; Congregational Trinitarian, 22; Independent Congregational, 2; Congregational Unitarian, 27; Episcopal, 15; Evan-

gelical Adventists, 1; Freewill Baptist, 1; German Lutheran, 1; German Evangelical Reformed, 1; Swedish Lutheran, 1; Jewish synagogues, 4; German Methodist, 1; Methodist, 2; Methodist Episcopal, 18; Independent Methodist, 1; Presbyterian, 17; Roman Catholic, 17; Swedenborgian, 1; Universalist, 6. In the above are included several of the oldest churches in the United States. The oldest church edifice in the city is Christ church, Episcopal, in Salem street, founded in 1723. The Old South church was erected in 1729 in the same place where the first edifice of the society had stood since 1669. During the revolution it was occupied by British soldiers as a place for cavalry drill. Immediately after the great fire of 1872, it was leased for two years to the government for a post office, a new edifice for the use of the society being in process of construction on the corner of Dartmouth and Royalston streets. The last service was held in it on Nov. 17. King's chapel, on the corner of Tremont and School streets, has been used for divine service since 1754; the first edifice was erected there in 1689. Brattle Square church, in the walls of which was imbedded a cannon ball fired from Bunker Hill, June 17, 1775, was taken down in 1871. When completed, the cathedral of the Holy Cross on Washington and Waltham streets, begun in 1867, will be the largest and most ornamental church edifice in New England. The great tower at the S. W. corner will be 300 ft. high. There are two convents of Sisters of Notre Dame in Boston, St. Joseph's in South Boston and St. Aloysius in East Boston.—There are five theatres in the city, the oldest of which is the Boston museum, which was founded in 1841 and has occupied its present location in Tremont street since 1846. The Boston theatre, in Washington street near Boylston, one of the largest theatres in the United States, was opened in 1854. It is capable of seating 3,400 persons, with standing room for 1,000 more. The Globe theatre, in the same vicinity, was opened in October, 1868. The Howard Athenæum, in Howard street, and the St. James, in Washington street, are devoted to varieties.—The principal cemeteries used by Boston are the Mount Auburn, embracing 125 acres, in Cambridge and Watertown; Forest Hills, with a still larger area, in West Roxbury; Mount Hope, also in West Roxbury, 105 acres; Cedar Grove, in Dorchester, 46 acres; and Woodlawn, in the towns of Everett and Chelsea. There are in the heart of the city several burial grounds not now in use, but of great historical interest. The oldest of these adjoins King's chapel at the corner of Tremont and School streets. It is not known when it was first used for interments, but certainly as early as 1658. The "old granary burying ground," in Tremont street, between Beacon and Park place, was established in 1660, and contains the tombs of John Hancock, Samuel Adams, Paul Revere, Peter Faneuil, Samuel

Sewall, and the parents of Franklin. The Old North burying ground on Copp's Hill, which was first used for interments in 1660, still remains, and is protected by a high stone wall.—The first settlement of Boston was made Sept. 7 (O. S.), 1630, by a portion of the company which came from England that year with John Winthrop. The Plymouth pilgrims became acquainted with the peninsula in 1621. The only person residing there in 1630 was William Blackstone, or Blaxton, supposed to have been an Episcopal clergyman, and to have arrived about 1623. David Thompson and Samuel Maverick lived on two islands in what is now Boston harbor. It was by invitation from Blackstone that Winthrop and his associates removed from Charlestown to the peninsula, the excellence of the water at the latter place, and its abundance, being the chief inducement to the change. Blackstone soon left the colony, and his lands were purchased by the settlers. More than 50 years later, the last Indian claim to any portion of the territory was extinguished by the payment of "a valuable sum of money" to the claimants. The Indian name of the peninsula, according to Mr. Drake, the highest authority, was Mushawwomuk, Shawmut being merely an abbreviation. Some of the most noted of the colonists were from Lincolnshire, and it had from the first been their intention to give the name of Boston to their chief settlement, in honor of the Rev. John Cotton, vicar of St. Botolph's church, in the Lincolnshire Boston. The town records begin about 1634. The officers who subsequently were known as "selectmen" were in existence in 1634, but how the institution originated is unknown. The town meetings begin to be of importance at this date. The first grand jury of the country met at Boston, Sept. 1, 1635, and presented 100 offences. The church of Boston was much troubled about Roger Williams and his heresy, and finding him resolute, handed him over to the general court, which banished him. The Antinomian controversy broke out in 1636, the occasion of it being the action of Mrs. Anne Hutchinson, a woman of superior understanding, whose conduct greatly vexed the church. Free schools were established, the town paying liberally for their support, and Indians being taught gratis. Negro slaves were first brought to the town in 1645, much to the people's anger. A malignant disease raged in 1646. In 1651 the place is described by an eye-witness as very flourishing. Mrs. Anne Hibbins, a widow, said to have been a sister of Gov. Bellingham, was hanged in 1656 for witchcraft. When, two years later, the general court made a law for the punishment of Quakers, two of the Boston members dissented; but three Quakers were executed on the Common for having returned from banishment in defiance of the law. When Goffe and Whalley, the regicides, came to Boston in 1660, they were openly entertained by the principal inhabitants. Boston sullenly acquiesced in the

restoration, but Charles II. was not proclaimed there until 14 months after his arrival at London. Down to the date of the English revolution there was a constant antagonism, sometimes fierce in its manifestation, between the colony and the royal government, and it was most intensely felt in Boston. A description of Boston in 1671 shows that the town had much increased in numbers and wealth. The streets were large, and many of them paved with pebble stones. The buildings were fair and handsome, some being of stone, and one is mentioned that cost £8,000. The next year a report was made to the English government in which the number of families is stated at 1,500. When the general court voted £1,890 for the rebuilding of Harvard college, Boston paid £800. In anticipation of attacks from the Dutch, in 1672, extensive fortifications were commenced. "Philip's war" began in 1675, when Indian scalps were for the first time brought to Boston. They were Boston men who led the van in the famous attack on the Narragansett fort, and the town is said to have suffered nearly five times as much as any other place from the war. Liberty to establish a printing press in the town had been granted in 1674, with two ministers for censors; and a printing house was opened in 1676 by John Foster, a graduate of Harvard college. He printed the histories of the Indian wars written by Hubbard and Mather. In November, 1676, a fire occurred, which destroyed 46 dwellings, a church, and other buildings. A fire department was then organized, but not with much immediate effect; for in 1679 another conflagration swept away 80 dwellings and 70 warehouses. The loss was estimated at £200,000. During the reign of James II., and under the rule of his governors Dudley and Andros, the town lived under a tyranny. Yet James's "declaration of indulgence" was well received there, and the churches held a thanksgiving on its account. On April 18, 1689, the people of Boston rose against the government, and overthrew it. In no part of the British empire was the revolution of 1688 more warmly supported than in Boston. The witchcraft delusion raged in 1692 in Boston, as in other parts of New England. In 1695 the town's churches were much agitated by the discussion of the question whether it is lawful for a man to marry the sister of his deceased wife, and they decided it in the negative, which decision was followed by the enactment of severe laws by the general court against marriages of affinity. A list of all the streets, lanes, and alleys was made in 1708, and they were found to be 110 in number. Long wharf was commenced in 1710, running 800 feet into the harbor. A severe fire happened in 1711, burning 100 edifices, including the first church that had been erected in Boston, after the rude hut which had witnessed the primitive devotions of the earliest settlers. Several persons were killed, and others wounded, by the blowing up of houses, and a

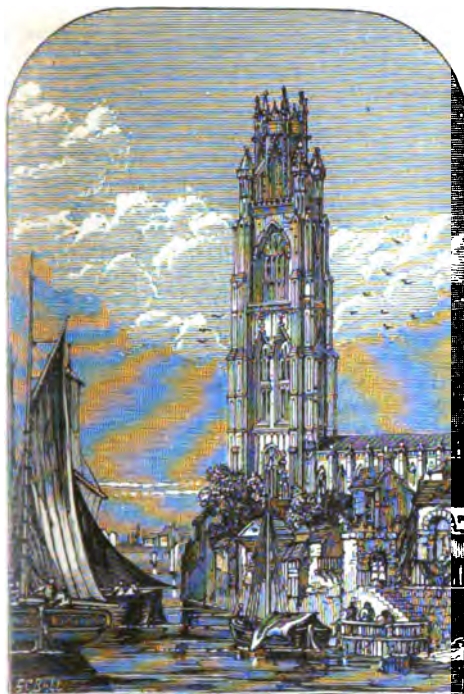
number of sailors perished while piously endeavoring to save the church bell. Mail routes were at this date established at Boston, running both east and west. What is known as "the great snow storm" occurred in February, 1717. Some of the Scotch-Irish settled in Boston in 1720, and introduced the linen manufacture, which excited much interest, and was greatly encouraged, spinning schools being established. Boston had often been ravaged by the smallpox, and when in 1721 it again broke out virulently, Dr. Zabdiel Boylston determined to introduce inoculation. He encountered savage and malignant opposition, especially from medical men, but owing to the influence of Cotton Mather was allowed to proceed. Of 286 persons who were inoculated, only 6 died, while of the 5,759 who took the disease naturally, 844 died. As the population of Boston could not have been above 12,000, half the people were attacked. The first insurance office was established in 1724. The traffic in slaves prevailed to some extent in 1727, but the action of the town was strongly against it on many occasions. The town was divided into 12 wards in 1736. It was the scene of great riots in 1747, in consequence of some of the citizens having been impressed by Com. Knowles. The first theatrical performance was in 1750, Otway's "Orphan" being the piece selected. This led to the passage of a law which prevented any more dramatic exhibitions for 25 years. Nov. 18, 1755, 17 days after the great earthquake at Lisbon, the town was "dreadfully shaken" by an earthquake, perhaps the severest ever known in New England, by which great damage was done and much fright caused. March 20, 1760, a fire consumed 349 buildings, the entire property destroyed being valued at £100,000. Relief was sent to the sufferers from the other colonies and from England. The case of writs of assistance, which began the American revolution, was tried at Boston in 1761. James Otis so distinguished himself therein, that he became the most influential man of the town, and was said to have governed it for the next 10 years. At the first news of the intention of the British government to apply its revenue system comprehensively to the colonies, Boston assumed that determined stand in behalf of liberty which gave her so conspicuous a part in the birth of the republic. "The Boston massacre" happened March 5, 1770, when three persons were killed by the fire of the soldiery, and five wounded. The destruction of the tea in 1773 was pronounced by the tory governor of the province the boldest stroke which had been struck in America. (See UNITED STATES.) The passage of the Boston port bill was the practical retort of the imperial government to the proceedings of the Bostonians. But though the commerce of the town was for the time destroyed, and the independence of the local government was suspended for nearly two years, other places

refused to profit from Boston's sufferings; and her people received from all parts of the country warm sympathy and solid assistance. In 1775 there were about 4,000 British troops in Boston, and several armed vessels in the harbor. The battle of Lexington (April 19) roused the country, and in a short time Boston was beleaguered by a large American force, full of spirit, but destitute of all the other essentials of war. Their attempt to fortify and hold Bunker Hill, which commanded the town, resulted in a battle, June 17, in which the Americans were defeated from lack of ammunition, but which had on them and their cause the usual influence of a victory. Gen. Washington arrived in the besieging camp July 2, and assumed command the next day. The siege was prosecuted with all the vigor that could be displayed, but it lasted nearly a year. On the night of March 4, 1776, the besiegers seized and occupied Dorchester heights, which commanded both town and harbor. The English made preparations to recover the heights, but were prevented from assailing them by the severity of the weather, which was extreme until the 7th, by which time the American fortifications had been rendered impregnable to any force the enemy could bring against them. The British commander was compelled to abandon the place March 17. During the war Boston supported the policy that ended in the adoption of the federal constitution. In the material prosperity that followed the inauguration of the new government Boston largely shared. Her business increased, and her commerce was extended to almost every part of the world. She became distinguished also as a seat of learning, and for the number of persons eminent in literature or in oratory who were among her citizens or those of her suburbs. From 1830 to 1860 she was popularly regarded as the headquarters of anti-slavery and other reform movements. In 1822 Boston was made a city, 170 years after the change had been first talked of, and 113 years after the failure to have the place incorporated in 1709. In 1869 a monster musical festival, styled the peace jubilee, was held in Boston, in a wooden coliseum built for the purpose, 500 ft. long and 300 ft. wide, with a capacity for 50,000 persons. The chorus comprised 108 societies, with about 10,000 singers, and there was a band of nearly 1,000 instruments, with a battery of artillery, and 50 anvils beaten by 100 men. The festival opened June 15, and lasted five days. The receipts exceeded the expenditures by about \$50,000. A second festival projected by the originator of the first, Mr. P. S. Gilmore, was held from June 17 to July 6, 1872, under the name of the international peace jubilee. The coliseum built for this affair was 550 ft. long by 350 ft. wide, with an extreme height of 115 ft. The chorus comprised 165 societies with 20,000 voices, while the orchestra numbered 2,000. Representative military bands were present from France, Germany, England, and the United States marine

corps. The expenditures, which amounted to nearly \$600,000, exceeded the receipts by about \$150,000. In November, 1872, occurred a great conflagration, which, excepting the fire in Chicago the year before, was the most extensive and destructive ever known in the United States. It originated from an unknown cause in a large granite building, devoted chiefly to dry goods, on the corner of Kingston and Summer streets, and was discovered about 7 o'clock in the evening of the 9th. A moderate wind prevailed, and the flames, with wonderful rapidity, spread simultaneously in all directions, but chiefly toward the north and east. The fire continued till noon of the following day (Sunday), when it was brought under control, but again broke forth, in consequence of an extensive explosion of gas, about midnight, and lasted till 7 o'clock on the morning of the 11th. The district burned over extended from Summer and Bedford streets on the south to near State street on the north, and from Washington street east to the harbor. Within these limits, excepting a portion bounded by Milk, Devonshire, State, and Washington streets, the devastation was complete. The burnt district covered about 65 acres, and was the centre of the great wholesale dry goods, boot and shoe, wool, and clothing trades. About 800 buildings, many of which were of granite, five and six stories high, including some of the grandest business blocks in the United States, and occupied by about 1,800 firms, were entirely destroyed. The total loss, according to the most accurate estimate, was about \$80,000,000. The total loss by insurance companies was \$52,676,000, of which \$35,851,600 was sustained by Massachusetts companies. Very few public buildings or residences were destroyed. The number of lives lost did not exceed 15, while the suffering was mainly occasioned by the temporary loss of employment to about 25,000 working men and women.

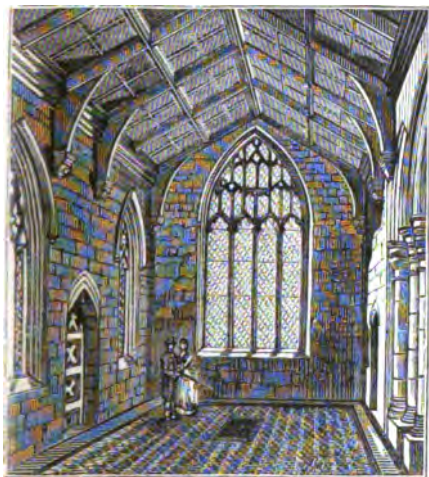
BOSTON, a seaport town and parliamentary borough of Lincolnshire, England, on both sides of the river Witham, 6 m. from the sea, and on the Great Northern railway, 28 m. S. E. of Lincoln, and 107 m. N. N. E. of London; pop. of the town in 1871, 15,576. The two divisions of the town are connected by an iron bridge, of a single arch, 86½ ft. in span. Boston is noted for the neatness of its streets, is lighted by gas, supplied with excellent water from a distance of 14 m., and built almost entirely of brick. The most remarkable of its edifices is the parish church of St. Botolph, the largest without transepts in the kingdom, built in 1309, and having a tower 282 ft. in height, on the plan of that of the cathedral of Antwerp. This tower is surmounted by an octagonal lantern, visible at sea for nearly 40 m. A window of stained glass has been placed in this church in honor of the Rev. John Cotton, who was vicar of St. Botolph's and one of the first ministers of Boston in America. There are numerous charitable institutions, a

grammar school founded by Philip and Mary in 1554, three subscription libraries, a court house, spacious market houses, and commodi-



St. Botolph's Church.

ous salt-water baths, with pleasant grounds, established in 1830 for the use of the public. The manufactures consist of sail cloth, cordage,



Cotton Chapel.

leather, iron and brass work, &c. There is a considerable foreign trade, chiefly with the Baltic, whence timber, iron, hemp, and tar are imported, while large quantities of agricul-

tural produce are transported to London. A monastery was founded here in 654 by the Saxon St. Botolph, and destroyed by the Danes in 870; "hence," as Lombard says, "the name of Botolph's town, commonly and corruptly called Boston." There were several other ecclesiastical establishments, which were suppressed in the time of Henry VIII. During the civil war Boston was for a time the headquarters of Cromwell's army. Its decline subsequent to the 16th century was caused by the prevalence of the plague, to which its low situation particularly exposed it, and by the gradually increasing difficulty of the Witham navigation. The healthiness of the place has been improved by draining the surrounding fens, and its commercial prosperity has been in some degree restored by great improvements in the channel of the river. Vessels of 300 tons now unlade in the heart of the town. It is connected by canals and railroads with the principal towns in the north. Boston was the birthplace of Fox the martyrologist.—See "The History and Antiquities of Boston," &c., by Pishey Thompson (royal 8vo, Boston, 1856).

BOSTON, Thomas, a Scottish Presbyterian clergyman, born at Dunse in March, 1676, died at Ettrick, May 20, 1782. He was educated at Edinburgh university, and ordained minister of Simprin in 1699, whence he was transferred to Ettrick in 1707. He was a member of the general assembly and an uncompromising champion of the independence of the Scottish church. His works, which are strongly Calvinistic, were first published collectively in 1852 in 12 volumes. The best known are the "Fourfold State," the "Crook in the Lot," and a "Body of Divinity," which is esteemed of high authority in the Presbyterian church. He also left "Memoirs of his own Life and Times."

BOSTRA. See **BOZRAH.**

BOSWELL, James, the biographer of Samuel Johnson, born in Edinburgh, Oct. 29, 1740, died in London, June 19, 1795. His father, as judge of the court of session, bore the title of Lord Auchinleck, after the family estate in Ayrshire. James studied at the universities of Edinburgh and Glasgow, and early in life became a high churchman and a tory, although his father was a rigid Presbyterian and a whig. His early ambition for intimate relations with distinguished persons was strengthened on his first visit to London in 1760, and it was with difficulty that his father prevailed upon him to give up the notion of going into the guards, and to resume the study of law. After remaining for a short time at the university of Utrecht, he travelled extensively, visiting Voltaire, Rousseau, and other men of note. In 1766 he became a member of the faculty of advocates, but never practised, and soon afterward published a pamphlet concerning the celebrated Douglas cause, and one in 1774 containing a report of the decisions of the court of session on literary property. He was

much ridiculed on account of his enthusiasm for Paoli, whom he had visited in Corsica; but his "Account of Corsica, with Memoirs of General Pasquale di Paoli" (Glasgow, 1768; 3d ed., London, 1769), was praised by Hume, Johnson, Gray, and Walpole, translated into several languages, and was in a great measure the means of obtaining for Gen. Paoli marked attention and a pension of £1,200 on coming to England. In 1769 Boswell, after numerous love adventures, married a cousin, Miss Margaret Montgomery, an accomplished lady, with whom he lived very happily, and who died in 1789, leaving him two sons and three daughters. The great event of his life was his acquaintance with Johnson, formed in 1763, which ripened into intimacy. Through Johnson's influence he became in 1773 a member of the famous Literary club, where he met Burke, Garrick, Goldsmith, Reynolds, and other eminent persons. He went with Johnson to the Hebrides, and his narrative of this journey appeared in 1785, soon after his idol's decease; it contains valuable records of Johnson's conversation, and is exceedingly entertaining. Between 1773 and 1785 Boswell only enjoyed such snatches of Johnson's company and conversation as were afforded by occasional visits to London. These visits were but a dozen in all, and, added to the time spent in the northern journey, make the whole period during which the biographer enjoyed intercourse with his subject only 276 days. But the "Life of Johnson," which was published in 1791, is universally conceded to be the most entertaining biography ever written, and Macaulay declares it to be the best in universal literature. John Wilson Croker's famous edition of this work, including the "Journal of a Tour to the Hebrides," with numerous additions and notes, appeared in 1831 (5 vols.), and has frequently been reprinted. Boswell succeeded to his father's estate in 1782, and removed to London in 1786. In 1790 he stood for parliament, but was defeated. In addition to the works already mentioned, he published several political pamphlets and a series of papers in the "London Magazine," entitled "The Hypochondriac," expressive of the feelings of a man subject to a depression of spirits, such as was common to himself and to Dr. Johnson. A posthumous volume of "Letters of James Boswell, addressed to the Rev. W. J. Temple," was first published from the original MS. in London in 1856. In his letters published in 1785, Boswell says: "Egotism and vanity are the indigenous plants of my mind." This frank avowal of his foibles and his eccentricities only served to enhance the popularity which he acquired by his amiability and accomplishments, and by his generous appreciation of real merit.—His eldest son, Sir ALEXANDER, born Oct. 9, 1775, an intimate friend of Sir Walter Scott and a member of the Roxburghe club, was a contributor to "The Beacon," a bitterly personal tory journal of

Edinburgh, and to its successor, "The Sentinel" of Glasgow. Having in the latter insulted Mr. James Stuart, a leading whig of Edinburgh, by an imputation of cowardice, he was challenged to a duel, in which he was mortally wounded, March 26, 1822, and died the next day. Mr. Stuart was tried for murder and acquitted. Sir Alexander was the author of a volume of "Songs, chiefly in the Scottish Dialect" (1808), "Olan Alpine's Vow" (1811), &c.—The second son, JAMES, was the author of a "Memoir of Edmund Malone" (1814) and editor of Malone's edition of Shakespeare, and also of several publications of the Roxburghe club. He died in London in 1822, in his 43d year; and it was immediately after returning from his funeral that Sir Alexander fought his fatal duel.

BOSWORTH, or *Market Bosworth*, a town and parish of Leicestershire, England, 12 m. W. of Leicester; pop. of the parish about 2,500. The town has a free grammar school, in which Dr. Johnson was an usher. On a moor in the vicinity the battle was fought, Aug. 22, 1485,



Bosworth Field—Monument over King Richard's Well.

in which Richard III. fell, and the wars of the roses were brought to an end. It was on the Crown hill near Bosworth that the crown was placed by Lord Stanley on the head of the earl of Richmond (Henry VII.) after the battle.

BOSWORTH, Joseph, D. D., an English philologist, born in Derbyshire about 1790. He was educated at the university of Aberdeen, and is a clergyman of the church of England. From 1829 to 1841 he was British chaplain at Amsterdam and at Rotterdam, afterward vicar of Walthe, Lincolnshire, and in 1858 became rector of Water Stratford, near Buckingham. His "Elements of Anglo-Saxon Grammar" (1823) and "Dictionary of the Anglo-Saxon Language" (1838) embody, according to the "Edinburgh Review," "the whole results of Anglo-Saxon scholarship." Among his other works are: "The Origin of the English, Germanic, and Scandinavian Languages and Nations;" "King Alfred's Anglo-Saxon Version of the Compendious History of the World by Orosius" (1856); and "The Gospels in Gothic of 360, and in Anglo-Saxon of 995, in parallel

columns with Wycliffe's Version of 1380, and Tyndale's of 1526" (1865).

BOTALLI, Leonardo, a Piedmontese physician, born at Asti about 1580. He was educated at Pavia, and went to France in 1561, where he acquired celebrity by his controversies with the faculty of Paris on the subject of bloodletting. In 1571 he was appointed physician in ordinary to Elizabeth, queen of Charles IX., and afterward to Catharine de' Medici. He wrote a number of important medical works, including *De Catarrho*, *De Lue Venerea*, *De Curandis Vulneribus Scelopetorum*, *De Via Sanguinis a Dextro in Sinistrum Cordis Ventriculorum*, and *De Curatione per Sanguinis Missionem*. His chief claim to distinction at present rests upon a singular error, namely, the description in the fourth of the works enumerated above of an exceptional case in which the *foramen ovale*, between the right and left auricles of the heart, remained open in the adult. Botalli supposed this to be a normal appearance, and described it accordingly as a natural opening, giving passage to the arterial blood into the left auricle; while in reality it exists, as a general rule, only in the fœtus, and when present in the adult does not allow the blood to pass through it. It is still known, however, as the "foramen of Botalli."

BOTANY (Gr. *botanê*, a plant or vegetable), the division of natural science which treats of plants. The history and bibliography of the science will be treated in this article; for a general account of plants and their organism, see PLANT. As a plant in its typical form is composed of organs, as roots, stem, leaves, &c., which have each a part to perform in the life of the individual, a study of vegetable physiology must be the foundation of botanical knowledge. This important division of botany treats of these organs in their most intimate structure, a study only possible by the improvements in the microscope and in organic chemistry. Vegetable anatomy dissects the plant, opens the structure of the root, stem, bark, and leaves, or studies the special organs (organography), and the various forms which these organs assume for different functions (morphology), as where the leaf becomes a petal, a stamen, or a carpel, yet preserving all the while its identity. The botanist also examines the functions of all the organs, the order and mode of their development, and finally those derangements of plant life which are followed, as in the animal, by death of a part or of the whole (nosology). The vast number and variety of plants existing on the globe require a knowledge of some system of classification, and systematic botany supplies the want with a rigorous method by which all plants wherever found may at once be placed in a definite position in the order adopted. As plants are not scattered haphazard over the earth, botanical geography must be studied, and with this plant history, using the fossil remains of plants of former geological ages for the purpose. Botany may then

be applied to the wants of every-day life, as in agriculture, horticulture, or medical botany. Animals often exhibit a marvellous instinct in selecting medicinal herbs, and observation of their habits has often, even in the present time, led to valuable discoveries.—The fragmentary history we have of the study of nature by the ancients indicates a much greater knowledge than is recorded; for instance, in the well known paradox of the Greek philosophers that plants are only inverted animals—a statement that certainly required an extensive knowledge of the phenomena of vegetation. The collected descriptions of known plants, however, were very limited, the Hebrew Scriptures containing names of about 70 species which can be identified, besides some others. Hippocrates of Cos (about 400 B. C.) described briefly about 200 medicinal plants; Theophrastus, the pupil of Aristotle, describes about 400; Dioscorides (about A. D. 100) treats of about 600 species, of which fewer than 150 have been recognized. Pliny the Elder, in his *Historia Naturalis*, devotes 16 books to botany, describing almost 1,000 plants; but from his unsystematic descriptions many cannot now be identified. The Arabian travellers added about 200 oriental plants to the 1,200 known before the 9th century. Jean Bauhin (born in 1541) wrote a universal history of plants, describing more than 5,000 species, illustrated by 3,577 figures; and later his brother endeavored to arrange the 6,000 plants then known. Linnæus described in his first edition of the *Systema Naturæ* 7,800 species, and in the second 8,800; and at his death in 1778, 11,800 were known. The influence of his example on his many pupils rapidly increased the number of known plants, until in the time of Jussieu 20,000 had been described; and the number at present known is at least 100,000. With so vast a collection the botanist would be overwhelmed had he not some methodical arrangement; and as the history of the various devices invented by botanists to order and catalogue their rapidly increasing stores is an important part of botany, it may be considered, after a brief sketch of the labors and discoveries of the early botanists.—The ancients recorded many botanical observations which do not seem to have been productive of results; although Herodotus (book i., 193) mentions the fact that in Babylonia the flowers of the male palm were tied to those that bear fruit "in order that the fly entering the date may ripen it, lest otherwise the fruit fall before maturity: for the males have flies in the fruit, just like wild fig trees." The seeds of palms were still undiscovered. Aristotle wrote two books on plants, known only from Latin and Arabic versions. Theophrastus taught that there was no philosophical distinction between trees, shrubs, and plants. He noticed the difference between palm wood and that of trees with concentric rings, a point used as the first distinction in the classification of flowering plants only within the

last 60 years. The parenchyma and woody fibre were also clearly distinguished by this remarkable botanist. Musa and Euphorbus, Roman physicians, published botanical observations, and Pliny gives some interesting descriptions. For 1,700 years all botanical investigation was at a standstill. The Arabians, it is true, travelled and collected plants; Wahab and Abu Seid went to China and described the *teha* or tea plant; Masudi, Abulfeda, Batuta, and Averroes all made their contributions, and have generally been honored by having plants named after them. After the fall of Constantinople (1453), and the revival of letters consequent upon that event and the invention of printing, botanists were not satisfied with commentaries on Aristotle and Theophrastus, and made many new investigations. In Germany, Otto Brunfels first published good woodcuts of living plants in 1530; for those in the work incorrectly attributed to *Æmilius Macer* (1480), and even in that of *Pietro de' Crescenzi*, are all of inferior value. Leonhard Fuchs attempted to arrange and illustrate the known plants of his time. Rauwolf travelled in the western part of Asia and collected many new plants. Prospero Alpini, Venetian consul at Cairo, and Melchior Guilandinus, explored Egypt. The discovery of the West Indies in 1492, and the doubling of the Cape of Good Hope five years later, opened new and rich botanical storehouses. Conrad Gesner of Zürich (1516-'65) established genera from the flower and fruit, and his attempt at classification was published by J. Camerarius in 1586, in a synopsis of the commentary of P. A. Matthioli, physician to the emperor of Germany. Charles de l'Écluse (*Clusius*), director of the imperial garden of Vienna, described accurately and elegantly many new plants, and was the best botanist up to his time (1526-1609). Lobelius of Lille (1558-1616) was the first to distinguish monocotyledonous from dicotyledonous plants. Andreas Cæsalpinus of Florence, physician to Pope Clement VIII., established (1583) a system of classification from fructification, divided trees according to the direction of the germ, made the distinction of sex in dioecious plants clearer by giving masculine names to staminate, feminine ones to pistillate individuals, and, what proved of more permanent benefit, analyzed several of the important organs of vegetation. Among the botanists of this period were Jacobus Theodorus Tabernæmontanus, who reproduced the figures of more than 8,000 species which had been already described; his nephew, Joachim Jungermann; Fabricius Colonna, who first published delicate copperplates of plants; Ad. Zaluskiński, a Bohemian, who wrote on the sexes of plants and described the floral organs. Jean Bauhin of Basel, a pupil of Fuchs, laid out the garden of the duke of Würtemberg at Montbéliard, and wrote a universal history of plants, but described them less accurately than Cæsalpinus. His brother Gaspar tried to distinguish each species by a

brief description of its characteristics, and grouped all species into genera; and his system, with that of Cæsalpinus, was used by botanists for some years. War then put an end to botanical as to all other scientific progress in Europe; and although Maragraf explored and described the vegetable riches of Brazil, little advance was made until Leewenhoeck with the microscope (1632-1723) commenced the examination of the hitherto invisible structure of vegetables, and thus gave a new impulse to botany, which resulted in investigations pursued with great accuracy by Nehemiah Grew (born about 1628), and by the Italian Marcello Malpighi (born in 1628). These two naturalists laid the foundation of vegetable physiology as a science by carefully examining all the cells and tissues of plants and seeds; and, although in the great number of their discoveries they were both often misled, many of their investigations were of great importance. Several of the French academicians made further discoveries: Charles Perrault on the movement of the sap; Renaulme on the leaves as organs of transpiration, absorption, and nutrition; Dodart on the direction of growth; Lahire on the growth of trees. Van Helmont and John Woodward made experiments on the nutrition of plants. In 1676 Thomas Millington and Bobart discovered the fertilizing power of anthers, which Grew confirmed, establishing the sexes of plants. In 1694 R. J. Camerarius demonstrated this discovery, and three years later Boccone experimented with palms, acting on the suggestion of Herodotus. All these doubtless led Linnæus to his sexual classification. From the physiological botany which had at the time of Linnæus become so prominent, naturalists turned for a while to geographical botany, and many of the pupils of the great Swede were sent out as collectors. Solander explored Lapland, Archangel, &c., and circumnavigated the globe with Cook and Banks; Peter Kalm explored North America; Peter Löffling, Portugal, Spain, and New Spain; Hasselquist, Asia; Forskal, Arabia; Ternström, the East Indies; Osbeck, China; Solander, Surinam; others, various parts of Europe. Tournefort (1656-1708) travelled in southern Europe and western Asia; L. Feuillée travelled in Asia in 1690 and in America in 1705; Charles Plumier observed and collected plants in the Antilles, and A. Fr. Frezier in Spanish America. The Burmanns, father and son, described almost 1,500 new species from the East Indies, and Commelyn and his son described Malabar plants. Other distinguished botanical travellers are: Adanson, on the Senegal; Thunberg, successor of Linnæus, at the Cape of Good Hope; Kämpfer, in Japan; Ruiz and Pavon, in Chili and Peru; Mutis, in equatorial America; Jacquin, in South America; Swartz, in the Antilles; Aublet, in Guiana; João Loureiro, in Cochin China; Commerson, almost all over the globe; Roxburgh, in Bengal; Desfontaines, in Algeria; Masson, at the Cape of Good Hope;

Ledru and Reidel, around the globe; Labillardière and Ventenat, in the Pacific islands; Du Petit-Thouars, in Madagascar; A. Michaux, in North America; Joseph Jussieu (1704-1779), among the Andes and the sources of the Plata; Alex. von Humboldt and Aimé Bonpland, in South America; Robert Brown, with the painter Bauer, in Australia; Ehrenberg, in Egypt, Abyssinia, Dongola, and Arabia (in which countries he collected 47,000 specimens); Lesson, in the Pacific islands; Baron Hügel, there and in the East Indies; Russegger, in Syria, Kordofan, and littoral Arabia; J. D. Hooker, in India and the Southern ocean; Leschenault de la Tour, in India; Griffith, in India; Victor Jacquemont, in eastern India; Siebold, in Japan; Ed. Rüppel and Schimper, in Nubia and Abyssinia; Otto, in the Cordilleras, on the Orinoco, and in North America; Ang. de St.-Hilaire, Spix, Martius, Moritz, and G. Gardner, in Brazil and Guiana; Schomburgk, in Guiana and Louisiana; Nuttall, in the United States; Tweedie, on the pampas in La Plata; Jo. Frazer and T. Drummond, in the United States; Bertero and Cl. Gay, in Chili; Allan Cunningham, in New Zealand and New Holland; Ohamisso, in the Pacific and around the globe; Meyen, around the globe, which Charles Gaudichaud circumnavigated three times with Freycinet. Pallas, Baer, Schrenck, Ruprecht, Somelien, Parrot, and Ehrenberg explored Russia. Among those who have made expeditions for botanical collections in the present generation are Vogel and G. Mann in Africa, Wright in Cuba and Texas, Brewer on the Pacific coast, Fendler in the S. W. United States, Horace Mann and Brigham in the Hawaiian islands, Fortune in Japan and eastern Asia, Remy in the Hawaiian islands, and Seemann in the Feejee islands.—*Classification of Plants.* Even before the collections of modern travellers had so immensely increased the number of known plants, it was found necessary to adopt some order or arrangement by which the recorded description of a species might be so placed that succeeding botanists could know what had been described. The classification adopted by Theophrastus into pot herbs and forest trees, cone plants, water plants, and parasites, and the more medicinal one of Dioscorides into aromatics, gum-bearing plants, eatable vegetables, and corn herbs, answered the purpose when botanists and described plants were few; but for the last century and a half botanists have been striving with the advance of their science to improve the classification of the rapidly increasing store of plants they had to study. Rivinus in 1690 invented a system depending on the formation of the corolla; Hamel in 1698, as Cæsalpinus had done before him, on the fruit alone. John Ray in 1703 published an amended natural system, separating dicotyledons and monocotyledons, but his work was little noticed. In 1720 Magnol arranged his system on the variations of the calyx and corolla. In 1785 Linnæus based his on the vari-

ations of the stamens and pistils, and this artificial system was at once adopted everywhere, and for many years was taught and used in all botanical classes in Europe and America. He devised the binomial system of nomenclature, denoting each plant by a generic and specific name. Although now entirely out of use, the Linnæan system is interesting as the best artificial one yet invented. Its outline is as follows:

MARRIAGES OF PLANTS.

Generation of plants.
Florescence.

PUBLIC, manifest, *phanerogamous*.

Flowers, visible.

Monoclinia (μόνος, one, κλινη, thalamus, couch).

Males and females on the same thalamus.

Flowers hermaphrodite: stamens and pistils in one flower.

Dignity (no affinity).

Males not cognate.

Stamens altogether unconnected with each other.

Indifferentium (no subordination of males).

Stamens of indeterminate length.

- | | | | | |
|-----------------|-----|-------------------|--------|--------------------------------|
| 1. <i>Mon-</i> | (1) | 8. <i>Oct-</i> | (8) | } <i>-andria</i>
(manhood). |
| 2. <i>Di-</i> | (2) | 9. <i>Enne-</i> | (9) | |
| 3. <i>Tet-</i> | (3) | 10. <i>Dec-</i> | (10) | |
| 4. <i>Tetr-</i> | (4) | 11. <i>Dodec-</i> | (12) | |
| 5. <i>Pent-</i> | (5) | 12. <i>Icos-</i> | (20) | |
| 6. <i>Hex-</i> | (6) | 13. <i>Icos-</i> | (20) | |
| 7. <i>Hept-</i> | (7) | 14. <i>Poly-</i> | (many) | |

Subordination (certain males preferred to others).

Two stamens shorter than the others.

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|-------------------|----------------------------|
| 14. <i>Di-</i> | } <i>-dynamia</i> (power). |
| 15. <i>Tetra-</i> | |

Affinity.

Males related and cognate.

Stamens adhering among themselves or with the pistil.

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|-----------------------|------------------------------------|
| 16. <i>Mon-</i> | } <i>-adelphica</i> (brotherhood). |
| 17. <i>Di-</i> | |
| 18. <i>Poly-</i> | |
| 19. <i>Syngenesia</i> | (births together). |
| 20. <i>Gynandria</i> | (wife-manhood). |

Diclinia (δύς, twice).

Males and females on distinct thalami.

Several males and females in the same species.

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|----------------------|-----------------------------|
| 21. <i>Mon-</i> | } <i>-æcia</i> (household). |
| 22. <i>Di-</i> | |
| 23. <i>Polygamia</i> | (many marriages). |

CLANDESTINE, hidden, *cryptogamous*.

Flowers scarcely visible to the naked eye.

24. *Cryptogamia* (secret marriage).

From the 1st to the 11th class, which has 12 stamens, the number of the class coincides with that of the stamens. The 12th class, *icosandria* (20 stamens), differs from the 18th, *polyandria* (many stamens), not by the number, but by the insertion of the filaments, which is on the inner side of the calyx in the former and on the receptacle in the latter. *Didynamia* has 4, *tetradynamia* 6 stamens, 2 of which are shorter in each class. In the *monadelphica* the stamens have the filaments more or less united; in the *diadelphica* they are in two groups; in the *polyadelphica*, in several. In *syngenesia* the anthers (rarely the filaments also) are united. In *gynandria* the anthers are borne on the pistil, either sessile or with short filaments. *Monæcia* have the stamens in one flower, the pistil in another, but both on the same plant; while in *diæcia* the two forms of flower are on distinct plants, and in *polygamia* the pistillate and staminate flowers are on the same or different plants in the same species. These classes are divided into orders as follows: the first 18 classes according to the

number of their distinct stigmata, as *mono-, di-, &c., gynia*; the 14th by the seed (when covered, *angiosperma*; when naked, *gymnosperma*); the 15th by the form of the fruit, *siliquosa* (poddied), and *siliculosa* (with silicles); the 16th, 17th, 18th, and 20th by the absolute number of their stamens; the 21st and 22d by the absolute number of the stamens and their adherence (*monadelphia, syngenesia, gynandria*); the 28d by the distribution of the hermaphrodite or unisexual flowers (*mon-, di-, triacia*). The 24th class, *cryptogamia* (secret marriage), has four orders, *filices* (ferns), *musci* (mosses), *algæ* (seaweeds), and *fungi* (mushrooms). The 19th, *syngenesia*, has five orders: flowers all fertile, hermaphrodite (*polygamia equalis*); flowers radiate, disk with hermaphrodite florets, ray with pistillate (*polygamia superflua*); disk with fertile hermaphrodite florets, ray with barren pistillate (*polygamia frustranea*); disk with barren hermaphrodite florets, ray with fertile pistillate (*polygamia necessaria*); each floret with its own calyx besides the common perianth (*polygamia segregata*), and also separated flowers, as the lobelia (*monogamia*). This artificial system is, then, founded on the differences, not on the similarities of plants, and does not tend to impart a knowledge of the structure of a plant beyond its stamens and pistils. Linnæus himself felt its deficiencies, and tried to work out what is called a natural system, which he declared to be the *primum et ultimum in botanica desideratum*.—Bernard de Jussieu, in his catalogues of the gardens of the Trianon, adopted an arrangement of plants according to their natural affinities; and as he never published his method, it was left for his nephew Antoine Laurent (1748–1886) to give to the world the first natural system in his *Genera Plantarum secundum Ordines Naturales disposita* (Paris, 1789), a work containing descriptions of almost 20,000 species, and celebrated as a monument of wonderful sagacity and profound research, as well as for the eloquence and precision of its style. Various modifications of Jussieu's system have been adopted by succeeding botanists. Among them three methods deserve a more special mention, as the works in which they have been adopted are in constant use. De Candolle's *Prodromus Systematis Naturalis Regni Vegetabilis*, a description of all known species of plants, commenced in 1824 and now nearly completed, adopts the descending series, as it is called; that is, those plants which are considered most complete in their organization are first described, and the series ends in the lower cryptogams. The *Prodromus* is so much used by all working botanists that a brief synopsis of the arrangement therein followed may be given. The primary divisions are *vasculares* and *cellulares*. *Vasculares* or *cotyledons* are furnished with cellular tissue and vessels, and their embryo has one or more cotyledons. This includes: I. *Ecogena* or *dicotyledons*, in which the vessels are arranged in concentric

layers, the youngest outside, and the embryo has opposite or verticillate cotyledons; II. *Endogena* or *monocotyledons*, in which the vessels are arranged in bundles, the youngest being in the middle of the trunk, while the embryo has a solitary or alternate cotyledons. The *exogens* are divided into *dichlamydeæ*, with calyx and corolla distinct, and *monochlamydeæ*, where the calyx and corolla form only one perianth. The *dichlamyds* are again divided into the *thalamifloræ*, in which the petals are distinct, inverted on the receptacle; the *calycifloræ*, in which the petals are free or more or less united, always perigynous or inserted on the calyx; and the *corollifloræ*, in which the petals are united into a hypogynous corolla, or not attached to the calyx. *Cellulares* or *acotyledons* are composed of cellular tissue only, and have no proper vessels, while the embryo has no cotyledons. This division includes the *foliaceæ* or plants which have leaf-like expansions and known sexes; and the *aphyllæ*, or plants which have neither leaf-like expansions nor (as was supposed when the method was published) sexes. John Lindley, in his "Vegetable Kingdom" (1846; 3d ed., 1853), adopts the ascending series. The number of orders is 303, and his classes are as follows:

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| I. <i>Thallogena</i> . | Flowerless Plants—Cryptogams. |
| II. <i>Aerogena</i> . | Stem and leaves indistinguishable. |
| III. <i>Emogena</i> . | Flowering Plants—Phanerogams. |
| | Fructification springing from a thallus. |
| | Fructification proceeding from a stem. |
| † Wood of stem youngest in the centre; cotyledon single. | |
| IV. <i>Endogena</i> . | Leaves parallel-veined, permanent; wood of stem always confused. |
| V. <i>Dictyogena</i> . | Leaves net-veined, deciduous; wood of stem, when perennial, arranged in a circle with a central pith. |
| ‡ Wood of stem youngest on the circumference, always concentric; cotyledons two or more. | |
| VI. <i>Gymnogena</i> . | Seeds quite naked. |
| VII. <i>Ecogena</i> . | Seeds enclosed in seed vessels. |

The alliances proposed by Lindley are as follows: *Algales*, ex. seaweeds; *fungales*, ex. mushrooms; *lichenales*, ex. lichens; *muscales*, ex. urn mosses; *lycopodales*, ex. club mosses; *filicales*, ex. ferns; *glumales*, ex. grasses; *arales*, ex. arads; *palmales*, ex. palms; *hydrates*, ex. naiads; *narcissales*, ex. amaryllis; *amomales*, ex. marants; *orchidales*, ex. orchis; *xyridales*, ex. spiderwort; *juncuales*, ex. bulrush; *liliates*, ex. lily; *alismates*, ex. alisma; *amentales*, ex. willow; *urticales*, ex. nettle; *euphorbiales*, ex. spurge; *quercuales*, ex. oak; *garryales*, ex. garrya; *menispermals*, ex. moonseed; *cucurbitales*, ex. melon; *papayales*, ex. papaw; *violales*, ex. violet; *cistales*, ex. rock rose; *malvales*, ex. mallow; *sapindales*, ex. soapwort; *guttiferales*, ex. clusia; *nymphales*, ex. water lily; *ranales*, ex. buttercup; *berberales*, ex. berberry; *ericales*, ex. heath; *rutales*, ex. orange; *geraniales*, ex. cranesbill; *silenales*, ex. pink; *chenopodales*, ex. amaranth; *piperiales*, ex. pepper; *ficoidales*, ex. mesembryanthemum; *daphnales*, ex. laurel; *rosales*, ex. apple; *saxifragales*, ex. saxifrage; *rhamnales*, ex. buckthorn; *gentianales*, ex. gentian; *solanales*,

ex. potato; *cortusales*, ex. primrose; *echiales*, ex. bugloss; *bignoniales*, ex. trumpet-creeper; *campanales*, ex. aster; *myrtales*, ex. pomegranate; *cactales*, ex. cactus; *grossales*, ex. currant; *cinchonales*, ex. honeysuckle; *umbellales*, ex. carrot; *asarales*, ex. birthwort.—Stephan Endlicher published *Genera Plantarum secundum Ordines Naturales disposita* (Vienna, 1836-'40), the most important systematic work since A. L. de Jussieu's of 1789. His classes answer to Lindley's alliances. We subjoin a summary of his method, from his *Conspectus diagnosticus*:

Two regions contain all plants: 1. *Thallophyta* (Gr. *θάλλω*, to pullulate, to green, grow, bloom, sprout), the *thalus* being either a leafy branched tuft or frond, or a flat-lobed mass of green matter upon the ground, a bed of fibres; and 2. *Cormophyta* (Gr. *κορμός*, Lat. *corpus*, *truncus*, stem, stalk), the *cormus* being the *locus* of Du-Roi's *Thouara*, *plateau* of De Candolle, *bulbous* of Ker, and *bulbus solidus* of others; in short, a stem, whether subterranean or superterranean. The *thallophyta* (having no opposition of stem and root, no spiral vessels nor sexes, but spores lengthened in all directions) he divides into two sections, viz.: 1. *Protophyta* (spores, first, born without soil, feeding by the surface, fructification vague; containing 3 classes, namely, *algae* in 7 orders and 123 genera, and *Mohenes* in 4 orders and 67 genera. 2. *Hysterophyta* (verrucae, posterior, later, born on languid or dead organisms, feeding from within, developing all organs at once, perishing definitely; constituting 1 class, *fungi*; birth hidden; sporidia none or within *asci* (*rubules*); in 5 orders, 274 genera. In this region there are 16 orders and 458 genera. The *cormophyta* (having polar opposition of stem to root, vessels and distinct sexes in the more perfect individuals) he divides into 3 sections. The first section is *acrobrya* (*ascos*, uppermost, highest, extreme, and *βρύοι*, I germinate, emanate, am bred); stem growing only at the top, lower part only food-bearing; comprising 3 cohorts, namely: 1. *Anophyta* (*ἀνω*, upward); no vessels; hermaphrodite; spores free within sporangia; with 2 classes, *hepatica*, in 5 orders and 20 genera, and *musci*, in 8 orders and 26 genera; 2. *Protophyta*: bundles of vessels more or less perfect; no male sex; spores free within sporangia of one or more lodges; 5 classes; *a. equisetia* (horsetails), in 1 order, 3 genera; *b. filices* (ferns), 7 orders, 73 genera; *c. hydropterides* (water-wings), in 3 orders, 29 genera; *d. selaginæ*, in 8 orders, 11 genera; *e. samia*, 1 order, *oyadacea*, 10 genera; 3. *Hysterophyta*: both sexes perfect; seeds without embryo, many-spored; parasites, with 1 class, *rhizanthia* (root-flowering), in 3 orders and 14 genera. The second section is *amphibrya*: stalk growing peripherically; with 11 classes, viz.: *a. phumacea*, in 2 orders, *gramineæ*, *grasses*, 299 genera, and *cyperaceæ*, sedges, 47 genera; *b. ananthoblasta* (*avariiv*, against, *βλαστειν*, germ), in 5 orders, 38 genera; *c. hallobia* (flax, pool, marsh, *βίος*, life), in 2 orders, 10 genera; *d. coronaria* (from the coronate perigonium), in 6 orders, 42 genera; *e. arietaria* (*ἀρειν*, broad, *πίς*, root), in 2 orders, 17 genera; *f. enata* (Lat. *enata*, sword), in 1 order, 110 genera; *g. gymandra* (female with male), in 2 orders, 305 genera; *h. collantinea* (Lat. *collantina*, dainties), in 3 orders, 88 genera; *i. fuciales*, in 1 order, *natadea*, 6 genera; *j. epadietiflora*, in 3 orders, 51 genera; and *k. principes*, in 1 order, *palmæ*, 63 genera. The third section is the *acromphibrya*: stem growing both at top and peripherically; divided into 4 cohorts: 1. *Gymnosperma*: ovules naked, fertilized immediately through the open fruit leaf or permeable disk, with 1 class, *conifera*, in 4 orders, 28 genera; 2. *Apetala*: no perigonium, or a rudimentary or simple one, calycing or colored, free or adhering to the ovary; with 6 classes: *a. pteridia*, in 3 orders, 28 genera; *b. aquatica*, in 3 orders, 10 genera; *c. tuliflora* (Lat. *tulipa*, catkin), in 15 orders and 1 sub-order, 72 genera; *d. olivacea* (Lat. *oliva*, a kitchen plant), in 4 orders, 60 genera; *e. thymalea* (*θυμάλει*, altar, flour), in 2 orders, 146 genera; *f. serpenticaria*, in 2 orders, 8 genera; 3. *Gamopetala*: perigonium double, exterior calyline, interior corolline, gamopetalic, seldom abortive; with 10 classes: *a. plumbaginea* (Lat. *plumbum*, a disorder in the eyes, which some species were believed to cure), in 2 orders, 10 genera; *b. aggregata*, in 8 orders, 859 genera; *c. campanulinea*, in 5 orders, 50 genera; *d. caprifolia* (from climbing like a goat, Lat. *capra*), in 2 orders, 246 genera; *e. constricta* (twisted), in 1 order, 227 genera; *f. nucifera*, in 5 orders, 219 genera; *g. tubuliflora*, in 5 orders, 90 genera; *h. poronata* (masked), in 7 orders, 218 genera; *i. petalanthæ*, in 4 orders, 70 genera; *j. bicornæ*, in 2 orders, 58 genera; 4. *Dialypetala* (*διαλπειν*, to dissolve, separate): perigonium double, outer calyline (with leaflets distinct or coalesced, free

or cognate with ovary, sometimes colored), inner corolline (parts distinct or seldom united by base of stamens, hypopert-, or epigynous), sometimes abortive; with 23 classes, viz.: *a. discantha* (disk-flowering), in 7 orders, 253 genera; *b. corniculata*, in 3 orders, 77 genera; *c. polycarpica* (many-fruited), in 8 orders, 123 genera; *d. rhodæa* (*ροδ*, pomegranate, here misapplied), in 5 orders, 201 genera; *e. nelumbæ* (Cingalese, *nelumbo*, water lily), in 3 orders and 1 sub-order, 10 genera; *f. parietales*, in 18 orders, 94 genera; *g. peponifera*, in 3 orders, 88 genera; *h. opuntia*, in 1 order, *cactæa*, 9 genera; *i. caryophyllinea* (*καρυφ*, walnut, and *φύλλων*, leaf, from the appearance of the flower buds of pinks), in 4 orders, 108 genera; *j. columnifera*, in 4 orders, 126 genera; *k. guttifera*, in 9 orders, 28 genera; *l. hesperides* (rockets, more fragrant in the evening, *ἑσπερος*), in 5 orders, 73 genera; *m. acera* (maples), in 5 orders, 86 genera; *n. polygalinea* (*γάλα*, milk, believed to favor milk secretion when fed upon), in 2 orders, 16 genera; *o. frangulacea*, in 7 orders, 100 genera; *p. licooca*, in 3 orders, 129 genera; *q. torobanthinea*, in 10 orders, 156 genera; *r. gruinæa* (like cranebilla), in 6 orders, 23 genera; *s. calyciflora*, in 8 orders, 102 genera; *t. myrtiflora*, in 2 orders, 173 genera; *u. roseiflora*, in 5 orders, 77 genera; *v. leguminosa*, in 3 orders, 421 genera.

The *Genera Plantarum* of Hooker and Benham, of which the first volume was completed in 1867, is the latest arrangement of orders and genera, and when finished will doubtless be for some time the guide in the classification of herbaria and local floras.—*Physiological and Anatomical Botany*. After the discovery of the microscope and the investigations of Grew and Malpighi, much study was devoted to the vegetable cell and the nature of cellulose. Mirbel, Dutrochet, Amici, Moldenhawer, Von Mohl, Unger, Frémy, and Schleiden have carefully observed the forms it assumes and the work it performs, Frémy distinguishing various kinds by chemical tests where optical tests failed. Schleiden calls the primitive utricle the cytoblast or germinating cavity; and Mulder in Holland and Schacht in Germany now lead those who consider all vegetation traceable from the cell-generating cytoblast. Pringsheim denies this. The movement of the sap was described by Corti in 1772, and Biot, De la Place, Fontana, L. C. Treviranus, Meyen, Cassini, Schultz, and Morren have published their observations on the circulation. The observers whose works may be consulted with profit for special phytotomic details are: on organic mucus, Brongniart, Mohl, Valentin; laticiferous tissue, Schultz (1839), Dippel, Hanstein (1863); protoplasm, Cohn, Unger, Max Schultz, K. H. Schultz; fibrous tissue, Purkinje, Morren; starch, Raspail, Fritzsche, Payen, Trécul, Nägeli; aleurone, Hartig, Trécul, Gris; color of plants, De Candolle, Mohl, Lawson, Morren; chlorophyll, Böhm, Mohl, Morren, Frémy, Gris, Verdel; cell contents, Weddell, Schacht; epidermis, Schleiden, Brongniart, Weiss; stomata, the Krokera, father and son, Thomson, Lindley, Unger, Morren; bark and cork, Duhamel (*Physique des arbres*), Senebier, Pallini, Sprengel, Gaudichaud; stem, Daubenton, Desfontaines, Duhamel, Mohl, Gaudichaud, Mirbel, T. Hanstein (also on root and leaves); root, Trécul, Goldman, Link, Garreau and Brauwera, Decaisne, Ohlert, Th. de Saussure, Macaire, Bouchardat, Chatin, Trinchi-netti; leaf, J. D. Hooker, Braun, J. Rossmann, Steinheil, Mercklin, Wretschko, Trécul, Bonnet;

movements of plants, Runge, Desfontaines, Meyen, Brücke, Darwin; phyllotaxy, Schimper and Brown; floral organs, Duval, Duchartre; anther, Purkinje, Fritzsche; pollen, Chatin, Wimmel, Nägeli, Hofmeister, R. Brown, Schleiden, Unger; ovary and ovule, Brongniart, Duchartre, Cramer, Grisebach, Tulasne, Deeke, Schacht, Henfrey, Radtkofer, Hofmeister; fruits, Lindley, Lestiboudois, Desvauz, De Candolle, Dumortier; vitality of seeds, De Candolle, Desmoulins, Girardin, Naudin; alimentation of plants, Dutrochet, Schumacher, Herbert Spencer, Hofmeister, Böhm, Hanstein, Hartig, Sachs, Payen, Vogel, Wittwer, Vierordt, Jac. Moleschott, Daubeny, Draper, Boussingault, Liebig, Grischow; respiration, Traube, Coremuinder, De Saussure, Gladstone. Of vegetable products: the proportions of the amylaceous bodies in plants (cellular tissue, inuline, dextrine, mannite, pectine, &c.) have been investigated by Bérard, Pélilot, Braconnot, Eichof, Payen, and Pereira; oily substances, by Hartig, Mulder, Donders, Iljenko and Laskowsky, Playfair, Gorgey, and Dumas; wax, by Brodie. The diseases of plants have been studied by Focke, Mnter, Hartig (potato disease), Von Mohl (grape disease, 1852), and Liebig. Economic botany has been treated by Fée, Geiger, Reissech, Royle, Richard, Pereira, Endlicher, Nees von Esenbeck, Martius, Guibourt, and Schacht. Various classes of plants have received special attention from the following botanists: Cryptogams in general, Agardh, Persoon, Berkeley, Ehrenberg, Kutzing, Decaisne, Thuret, Derbis, Nägeli, Cohn, Greville; algæ, Harvey, Johnstone, and Croal; fungi, Berkeley, Montagne, Cordier, Tulasne, Kromholz, Sturm, Benarden, Badham, Cooke, Pringsheim; mosses, Hedwig, Sullivan; lichens, Tuckerman, G. von Holle, Leighton, Spier Schneider, J. D. W. Bayerhofer; ferns, W. J. and J. D. Hooker, Moore, Eaton, Lowe, Baker; grasses, Munro, Kunth, Gray; palms, Martius, Seemann; liliaceæ, Redouté; conifers, Lambert, Richard; orchids, Bateman, Blume, Hooker, Moore, Darwin; cactaceæ, Engelmann; piperaçæ, Miquel; labiates, Bentham; rhododendrons, Hooker; geraniaceæ, Sweet, Andrews; heaths, Andrews. Local floras have been published as follows: United States, Gray, Torrey, Chapman, Brewer, Watson; Brazil, Martius, Saint-Hilaire and Jussieu, Humboldt, and Bonpland; Peru, Ruiz and Pavon; Chili, Bertero, Gay; Guiana, Schomburgk; West Indies, Grisebach, Wright, Larran, Descourtilles, Sloane; Antarctic, Hooker and Harvey; Pacific, Gray, Gaudichaud; Hawaiian Islands, H. Mann; Feejee and Samoan Islands, Seemann; New Zealand, Hooker; Australia, Hooker, Muller, Sweet, Bentham; Philippine Islands, Blanco; Hong Kong, Bentham; China, Lourieiro, Hance; Japan, Thunberg, Siebold; Siberia, Gmelin, Maximovitch; India, Wight, Roxburgh, Wallich, Hooker, and Thompson; Java, Blume; Ceylon, Thwaites; Arabia, Forskal; Greece, Sibthorp; Italy, Gussone, Tenore, Bertoloni;

Austria, Jacquin, Kock, Reichenbach; France, Saint-Hilaire; Russia, Pallas; Lapland, Linnaeus; Sweden, Andersen; Denmark, Oeder; England, Curtis, Smith, Hooker, Bromfield, Sowerby, Greville, Bentham, Thornton, Babington; Africa, Desfontaines, Hooker, Palisot de Beauvois, Harvey, Oliver. We give below an alphabetical list of the principal authors, native and foreign, who have applied themselves to the botany of the United States and of British America:

WILLIAM BALDWIN assisted Elliott in the sketch of the botany of South Carolina and Georgia.

BENJAMIN S. BARTON, professor of botany in Philadelphia, "Collections for an Essay toward a Materia Medica of the United States," 1798-1804; "Fragments of the Natural History of Pennsylvania," fol., 1799; "Progress of Vegetation," 1791; "Elements of Botany," revised, and with additions of British examples, &c., London, 1804; *Flora Virginica* (reaching only to the *tetrandria* of Linnaeus, but an enlarged and modified edition of the work of Clayton and Gronovius), Philadelphia, 1813; "Specimen of a Geographic View of Trees," &c., of North America between lat. 71° and 75° (incomplete).

L. C. BEXCK contributed toward the botany of Illinois and Missouri (not beyond the *monadelphia* of Linnaeus); "Botany of the United States north of Virginia," 1833; 2d ed., 1843.

JACOB BIGNLOW, *Flora Botanica*, 1814, 24, 40; "American Medical Botany," 1817-21, 8 vols., 60 colored plates; "On the Forwardness of Spring in different parts of the United States," 1818.

J. A. BRERETON, *Prodromus Flora Columbianae* (of Washington), 1880.

W. H. BREWER, "Botany of the California Geological Survey," 1878.

BROWN, "List of Plants collected on the Coast of Baffin's and Possession Bay," London, 1819; *Chloris Melvillianae*, 1823.

MARK CATESBY, "Natural History of Carolina, Florida, and the Bahamas," 3 vols. fol., 1743; also *Hortus Britannicus Americanus*, treating of trees fit for England (also under the title of *Hortus Europæ Americanus*), 1763-7.

CHAPMAN, "Botany of the Southern United States."

J. CORNUTUS, a French physician, published a *Canadensium Plantarum Historia*, Paris, 1685.

M. CUTLER wrote an account of the vegetable productions of New England, 1785, probably the first essay of a scientific description.

J. DABRY wrote on the vegetable productions of the southern States, and (1841) a "Manual of Botany."

W. DARLINGTON, "Essay on the Development of the External Forms of Plants," compiled from Goethe, 1839; on *gramineæ*, as important to man; a *Flora*, 1836, and a *Flora Cæstrica* (of West Chester, Pa.), 1837; on "Agricultural Botany," and "Memorials of J. Bartram, H. Marshall," &c., Philadelphia, 1849.

DEWEY, on cartography, "Billman's Journal," vol. vii.

A. EATON's "Manual of Botany for North America," on the system of Linnaeus, 1st ed. in 1818, 8th in 1840 (in the last edition Wright cooperated), and some elementary books, marked an epoch in the progress of the science in this country.

A. ELLIOTT issued in numbers (1816-24) a valuable "Sketch of the Botany of South Carolina and Georgia."

G. B. EMERSON, on "Trees and Shrubs of Massachusetts," 1846.

G. ENGELMANN wrote on *Cytisus* in 1842, and with A. Gray on Lindheimer's Texan plants, 1-45.

A. *Flora Columbianae* appeared at Washington in 1819, anonymously.

J. R. FORSTER, *Flora America Septentrionalis*, 1771 (also in Bossu's travels, vol. vii.).

A. GRAY, an eminent botanist of the United States; elementary books, monographs of American *Rhynchoptera*; a revision of *Melanthaceæ*, remarks on *Ceratophyllaceæ*; has catalogued American *Gramina* and *Cyperaceæ*; reviewed J. Dumaa, J. B. Boussingault, Johnston, and Draper, on the Chemistry of Vegetation; notes on the mountains of North Carolina; notices on Rafinesque, and on European *herbaria*; *Chloris Boreali-Americana*, illustrating rare plants; also a complete "Manual of the Botany of the Northern United States," 5th ed., 1868; "Introduction to Structural and Systematic Botany and Vegetable Physiology," 1858; "Field, Forest, and Garden Botany," 1869; began in 1849 his great work, *Genera Flora Americana Borealis illustrata*, which is to be in 10 vols. Many of his short works have been published in American

- literary periodicals. He was associated with G. Engelmann in a work on Lindheimer's plants of Texas; with W. S. Sullivan, who wrote on the mosses and liverworts of the United States east of the Mississippi; with J. Torrey, in the "Flora of North America," an abridged description of indigenous and naturalized plants north of Mexico, 2 vols., 1883-'88.
- JO. FR. GRONOVIVS published *Flora Virginica*, Leyden, 1739-'43; 3d ed., 1763, by his son, augmented with the observations of Clayton, Colden, Mitchell, Kaln, &c.
- W. JACKSON HOOKER, one of the best European botanists, published lists of plants on the E. coast of Greenland, 1823; an account of a collection of Arctic plants by Edw. Sabine, 1824; with Walker-Arnott, the botany of Capt. Beechey's voyage to the Pacific and Behring strait, 1841; a *Flora Boreali-Americana*, 2 vols. 4to, 1829-'40, 283 plates (including Texas). His agents were Douglas, Drummond, Richardson, and others.
- ANDRÉ MICHAUX, *Histoire des chênes de l'Amérique*, published by his son François André, Paris, 1801, with 80 plates by the renowned P. J. Redouté. The son published, moreover, *Voyage à l'ouest des monts Alleghany et retour à Charleston par les hautes Carolines*, &c., Paris, 1804; *Mémoires sur la naturalisation des arbres forestiers de l'Amérique Septentrionale*, &c., 1805; *Notices sur les îles Bermudes*, 1806; *Histoire des arbres forestiers de l'Amérique Septentrionale* (discussing their uses in art, commerce, &c.), 3 vols. 4to, with 145 plates, 1810-'18; and in connection with C. L. Richard, a *Flora Boreali-Americana*, containing the discoveries of his father, with 61 plates, 1808, republished with a mere change of title in 1820. An English epitome of the "Oaks," 1810-'12, containing 26 black plates; and the imitation under the name of the "North American Sylva, or Forest Trees of the United States, Canada, and Nova Scotia," 150 colored engravings, 4 vols., Paris, 1817-'18; 2d edition at New Harmony, Ind., 8 vols., 1840. An edition was printed at Paris for Philadelphia. (See Nuttall for the supplement.)
- H. MUEHLENBERG of Lancaster, Pa., catalogued the plants of that region, described *Gramina et plantas calamarias* of North America, 1817; his works were partly republished by his son.
- THOMAS NUTTALL published "Genera of North American Plants, and a Catalogue of Species," 2 vols., 1817-'18; a description of new species and genera of compositae, collected on a voyage across the continent, in Oregon, Upper California, and on the Hawaiian Isles, in 1834-'5 ("Transact. Amer. Philos. Soc." 1841); and a supplement to F. A. Michaux's "North American Sylva," with additions of the trees observed in the Rocky mountains, Oregon, on the shores of the Pacific, &c., Philadelphia, 1749, with 122 colored plates; besides the works noticed elsewhere.
- FR. TRAUGOTT PURSH (anglicized Pursh), *Flora America Septentrionalis*, 2 vols., London, 1814-'16; a good work.
- DE LA PÉRIÈRE, *Flore de l'île de Terre-neuve*, Paris, 1829.
- C. S. RAVENESQUE-SCHMALTZ published *Neogenyton* (describing 66 new genera of North American plants); a "Medicinal Flora of the United States," with more than 100 figures; the "Herbarium;" and the "New Flora and Botany of North America," supplemental to all American botanical works, as well as those of the great European botanists, &c.
- RICHARDSON, "Botanical Appendix to Sir J. Franklin's Narrative of a Journey on the Shores of Hudson's Bay and the Polar Sea."
- J. L. RIDDELL, "Synopsis of the Flora of the Western States," 1835.
- L. D. VON SCHWEINITZ, of Bethlehem, Pa., wrote, besides what is noticed elsewhere, a monograph of the American viola, and of the species of carices, and a synopsis of native fungi; a "Narrative of the Expedition to the Source of St. Peter's river, to Lake Winnipeg," &c., London, 1828, *Specimen Flora America Septentrionalis Cryptogamica*, Raleigh, 1821.
- J. L. E. W. SHEROUT, *Flora Carolinensis*, &c., collected or compiled, 3 vols., Charleston, 1804.
- C. W. SHORT, *Flora Lexingtoniensis*, 1830, a supplemental catalogue of the phanerogamous plants and ferns of Kentucky. He sent many plants and seeds to the Atlantic states and to Europe.
- W. S. SULLIVANT and L. LESQUERREUX, several works on the mosses of North America, 1845-'64.
- JOHN TORREY published, besides other works, a "Flora of the Northern and Middle States" (not beyond the *ice-andria* of Linnaeus), 2 vols., 1824; a catalogue of the North American genera, according to Lindley's "Introduction," 1831; a monograph of the North American *Oyperaceae*; a "Flora of the State of New York, with a full Description of all indigenous and naturalized Plants, Remarks on Economy and Medicine," Albany, 1843-'4 (in the 8d part of the "Natural History of New York," 1839), with 161 colored plates; *Icones ineditae ad Floram Philadelphia illustrandam*, 180 colored plates. Some of Torrey's writings are found in the American scientific periodicals.
- EDWARD TUCKERMAN arranged the carices, 1843, and gave a synopsis of the lichens of the Northern States and British America, 1848.
- S. WATSON and others, "Botany of the 40th Parallel Exploring Expedition," 4to, 1872.
- We add a list, in chronological order, of catalogues of the plants of various regions of America:
- JOHN BANISTER, in Virginia, 1690 (in *Raji Hist. Plantar.*, II. parte, London, 1688).
- DAVID HOSACK, *Hort. Elginensis*, 1801-'11.
- C. W. EDDY, *Plantae Plandomenses* (around J. L. Mitchell's country seat), 1837.
- J. LE CONTE, on the island of New York, 1811.
- H. MUEHLENBERG, *Catal. Plantar. Amer. Sept.*, 1818-'18.
- J. TORREY, of plants within 80 miles of New York city, 1819.
- C. S. RAVENESQUE, of the botanical garden of the university of Transylvania, 1824.
- L. D. VON SCHWEINITZ, of plants collected in the Northwest territory (in the narrative of the expedition), London, 1825.
- J. TORREY, account of a collection of plants from the Rocky mountains, &c., 1827.
- E. HYTHCOCK, of the vicinity of Amherst college, 1829, and of Massachusetts, 1835.
- H. H. EATON, a few specimens from near Troy, 1832.
- H. B. CROOK and Loomis, of the neighborhood of Newbern, N. C., 1838.
- J. BACHMAN, about Charleston, S. C., 1834.
- T. NUTTALL, collection toward a flora of Arkansas, 1834.
- M. A. CURTIS, about Wilmington, N. C., 1834.
- L. E. GIBBS, phanerogamous plants about Columbia, S. C., 1835.
- DR. AITKEN, about Baltimore, 1836.
- J. L. RIDDELL, supplementary catalogue of plants of Ohio, 1836.
- J. A. LAPHAM, near Milwaukee, 1838.
- W. S. SULLIVANT, about Columbus, O., 1840.
- DEWEY's report on plants of Massachusetts, 1840.
- S. T. OLNEY, Rhode Island plants, 1844.
- Botanical Society of Wilmington, Del., plants of New Castle co., 1844.
- S. F. BAIRD, contributions toward a catalogue of trees and shrubs of Cumberland co., Pa., 1845.
- A. W. CHAPMAN, a list of plants about Quincy, Fla., 1845.
- F. B. HOUGE, plants in Lewis co., O., 1845.
- H. P. SARTWELL, of Western New York, 1845.
- HORACE MANTY, phanerogamous and vascular cryptogamous plants of North America north of Mexico, 1863.
- The following writers, in addition to those already named, may be consulted by the student:
- ENGLISH.
- J. C. LONDON, author of 14 valuable works, from 1804 to 1841; and Mrs. J. W. LONDON, author of several popular ones, especially for ladies, 1840-'57.
- SIR J. PAXTON, "Magazine of Botany," 8 vols., 1834-'43, with 500 tables, and (assisted by J. Lindley) a pocket botanical dictionary, 1858.
- JOHN LINDLEY (besides the greater works mentioned above), "Outlines of the First Principles of Botany," 1830; "Key to Structural, Physiological, and Systematic Botany," 1835; "Ladies' Botany," 1837; "Introduction to Botany," 8d edition, 1839; "Elements of Botany," 1841.
- JOHN SMITH, "Domestic Botany," 12mo, London, 1871.
- FRENCH.
- BEISSAU-MIEBEL, *Analyse des plantes*.
- DE CANDOLLE, *Théorie élémentaire de la botanique*, édit. 3, par Alphonse de Candolle, 1844.
- ADRIEN DE JUSSIEU, *Éléments de botanique*, 1845; translated into English by J. H. Wilson, 1849.
- LEBOUDRE-DELAVAL, *Traité élémentaire de physiologie végétale*, 1845.
- RICHARD, *Nouveaux éléments de botanique*, 7th ed., 1848.
- P. DUCHARTRE, *Éléments de botanique*, 1867.
- LE MAOUT et DECAISNE, 1868.
- GERMAN.
- ENDLICHER and UNGER, *Grundzüge der Botanik*, 1848.
- N. J. DE JACQUIN, *Einkleitung*, 1785-1800; revised by his son, 1840.
- K. B. KUNTH, *Lehrbuch*, 1847.
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BOTANY, a parish and township in the electoral district of Canterbury, Cumberland county, New South Wales, on Cook's river and on Botany bay, 5 m. S. of Sydney; pop. about 700. It is one of the most popular resorts of excursionists from Sydney on account of its beautiful scenery. It contains the Sydney water works, occupying an area of 30 acres, and weekly supplying that city with about 18,000,000 gallons of water. There are five places of worship, a temperance hall, and a post office. The principal industry is market gardening. It is an agricultural district, though the surrounding country consists of swamps and sand hills, with but occasional patches of fine alluvial soil.

BOTANY BAY, a harbor on the E. coast of Australia, county of Cumberland, New South Wales, 5 m. S. of Sydney, the N. head (Cape Banks) being in lat. 34° S., lon. 115° 16' E. The harbor is about 5 m. long from N. to S. and 6 m. wide from E. to W., but the entrance is little over 1 m. across. It receives the waters of Cook's and George's rivers, is capacious and open, but affords poor shelter for shipping. The S. shore of Botany bay is the spot first touched at, in April, 1770, by Capt. Cook, on his discovering the E. coast of Australia. Though the coast there is comparatively barren, Mr. (afterward Sir Joseph) Banks, botanist of the expedition, was so impressed with the profusion of the unknown local flora that the name of Botany was given to the bay. The reports of Capt. Cook led the English authorities to send out Capt. Arthur Phillip, the first colonial governor, in 1788, with about 1,000 persons, over 700 of whom were convicts; but neither the harbor nor its swampy surroundings were suitable for colonization, and he removed the men to Port Jackson. A brass plate on the cliffs marks Capt. Cook's first landing place; and a monument was erected there in 1828, by Bougainville and Ducampier, in honor of La Pérouse, who previous to his shipwreck was last heard from by the French government, through his letter dated Botany bay, Feb. 7, 1788.

BOTETOURT, a S. W. county of Virginia, intersected by James river; area, about 500 sq. m.; pop. in 1870, 11,829, of whom 8,168 were colored. It contains the sources of Craig's and Catawba creeks. Besides the Blue Ridge, which forms its S. E. boundary, there are other high ridges within its limits. The famous Peaks of Otter are near the dividing line between this and Bedford county; Middle mountain is on the N. W. border. The James River canal has been opened from Richmond to

Buchanan. The chief productions in 1870 were 152,799 bushels of wheat, 95,986 of Indian corn, 92,807 of oats, 8,752 tons of hay, and 196,459 lbs. of tobacco. There were 2,044 horses, 1,984 milch cows, 8,426 other cattle, 8,832 sheep, and 6,192 swine. Capital, Fincastle.

BOTETOURT, *Norborne Berkeley*, baron, an English statesman, born about 1717, died at Williamsburg, Va., Oct. 15, 1770. He was summoned to parliament as Baron Botetourt (the peerage having been in abeyance since 1406), April 13, 1764. He arrived in Virginia in November, 1768, succeeding Sir Jeffrey Amherst as governor-in-chief of the colony. His first purpose was to enforce submission, and in 1769 he dissolved the assembly, which, however, convened in a private house. On becoming better acquainted with the colonists, he forwarded to England their remonstrances, with a favorable opinion against parliamentary taxation. A promise of repeal was held out to him by Lord Hillsborough, but finding himself deceived he demanded his recall, and died soon afterward of bilious fever aggravated by chagrin. He presented at his own expense gold and silver medals as prizes to the students of William and Mary college; and his statue was erected at that institution by the assembly in 1774. His title expired with him.

BOTH, two Dutch painters, brothers, natives of Utrecht. **I. Jan**, born about 1610, died about 1650. He was a pupil of Bloemaert, and lived in Italy, where he produced exquisite landscapes, representing perfectly Italian atmospheric effects. **II. Andreas**, drowned at Venice in 1650. He was also a pupil of Bloemaert, and, besides introducing figures into his brother's landscapes, painted after the manner of Bamboccio, but with finer coloring.

BOTHNIA, a gulf between Sweden and Russia, constituting the northern arm of the Baltic sea, extending from lat. 60° to 65° 50' N., 400 m. in length, with an average breadth of 120 m. At its mouth, about midway between the two shores, is the Aland archipelago, belonging to Russia, and the main entrance is the Alands Haf, a strait about 24 m. wide, on the Swedish side of the islands. About midway of its extent it is gathered into a channel much narrower than its main body, called the straits of Quarken. The channel is also further intercepted at this place by several small islands, the principal of which is Holmö. The entire coast line of the gulf is very irregular. There is a strong current, or gulf stream, setting constantly from the head of the gulf southward, through Quarken, to Aland, where it divides into two, one passing E. and the other W., to reunite again, and also with a third current from the gulf of Finland, near the island of Kokar, whence it sets southward through the Baltic. There are good harbors, the principal of which on the Russian side are Abo-Björneborg, Uleaborg, and Tornea; and on the Swedish, Gefle, Hernosand, Pitea, Umea, and

Lulea. The S. shore of the gulf is annually visited by shipping for the export of timber and naval stores. It is usually completely frozen in the winter, so that armies have marched across it. The strong current and the abundant supply of fresh water, from a shed of an average breadth of 150 m. throughout its entire extent of coast line, give the waters of this gulf great freshness. The gulf of Bothnia presents an undoubted instance of slow upheaval of its E. and W. coasts, now taking place without volcanic action, at the approximate rate of two or three feet in a century. The coasts S. of Quarken are generally precipitous, and N. of the straits low and sandy. The numerous rivers which flow from Sweden and Finland into the gulf abound with fish, especially a kind of small herring called *strömming*, which constitutes a prominent article of food among the lower classes. A large part of the population on the W. coast are occupied in catching them. Most of these herrings are dried in the usual manner, but a considerable portion undergo fermentation in a closed cask, after having been previously a little salted and exposed to the air for a short time. The fish thus acquires a sour taste, and is called *surströmming*.

BOTHWELL, a village and parish of Lanarkshire, Scotland, on the N. shore of the Clyde, 8 m. E. S. E. of Glasgow; pop. of the village and parish about 18,000. The old Gothic church of Bothwell was used as a place of worship till 1828. A new parish church, with a tower 120 ft. high, was erected in 1833. The parish contains extensive iron works and collieries. It is famous in history for the battle fought on Bothwell bridge, about 1 m. from the village, June 22, 1679, between the Cov-



Bothwell Castle.

enants and the royal troops, in which the former were defeated with great loss. The ancient castle, once the stronghold of the Douglasses, is on a summit surrounded by woods, and is one of the finest ruins in Scotland. The manse of Bothwell was the birthplace of Joanna Baillie, whose father was minister there.

BOTHWELL, James Hepburn, fourth earl of, the third husband of Mary, queen of Scots, born about 1526, died at Malmö, on the coast of Sweden, in 1576. He occupied an influential position in the parliament of December, 1557. In 1558 he was made a lord of the articles, and shortly after lieutenant of the borders. In 1559 he intercepted Cockburn, master of Ormeston, near Haddington, as he was carrying £3,000 from England to aid the Scotch reformers. A little later, when the reformers showed signs of yielding before the regent's troops, he declared the earl of Arran, one of their leaders, a traitor to the government. In 1560, however, when Protestantism was made the established religion of the country, Bothwell declared himself of that faith, and was one of the Protestant nobles sent to France to offer their escort and service to Mary, queen of Scots, whose husband, the dauphin, had just died. Mary returned to Scotland in August of this year (1561), and at once formed a government under the leadership of her illegitimate brother, Lord James Stewart, Bothwell becoming a member of the privy council. But his quarrels and excesses made him intolerable in this position, and at the end of the year he was for a short time banished from Edinburgh. He now effected a reconciliation with the earl of Arran, and the two entered into a conspiracy to seize the queen at Falkland, on a journey into the earldom of Murray. Arran, who was already showing symptoms of insanity, changed his mood and confessed the plot. Both conspirators were imprisoned in Edinburgh castle; but Bothwell escaped, and was on his way to France when he was driven back by a storm and arrested at Berwick. Here he was kept three months, and then carried to London and imprisoned in the tower. The English government detained him there, without trial, for nine months; but the queen of Scots requested his release, although her ministers opposed his return to Scotland; and he was finally allowed to pursue his journey to France. In that country he was well received, and made captain of the Scottish guard; and he remained there till 1565, a few months before the marriage of Mary with Darnley at Edinburgh. Lord James Stewart, who had now received the title of earl of Murray, having caused him to be indicted for high treason, he once more fled the country, and a decree of outlawry was passed against him. After a short period, of which we have no detailed account, he suddenly appeared again in Scotland, gained Mary's favor, and in October, 1565, was a member of the newly organized privy council and a commander in Mary's army against the Scottish nobles who had taken up arms to oppose her marriage with Darnley. In 1566 he married Lady Jane Gordon, daughter of the earl of Huntly, who had been lord chancellor of Scotland. In the matter of the murder of Rizzio, Bothwell was a warm partisan of the queen, and earnestly opposed the plot. After

its consummation he aided the flight of Mary and Darnley to Dunbar castle, then under his control. On the return of the royal pair to Edinburgh Mary compelled Bothwell's bitterest enemies, Murray and Argyle, to go through the form of reconciliation with him. Many matters of moment were intrusted to him. Among these was the task of quelling a disturbance at Liddesdale, where he was severely wounded. Mary, who was at Jedburgh when this occurred, on hearing of his danger rode to Hermitage Castle, where he was lying, making the journey of 20 miles and returning the same day—an exertion which threw her into a violent fever, during which Bothwell in his turn hastened to visit her, though he was obliged to be conveyed to Jedburgh. The nature of the relations between him and the queen from this time forward has been the subject of a violent historical controversy between the assailants and defenders of Mary; but the following summary is confined to facts which are not denied by either party. (See MARY STUART.) The belief that Bothwell aspired to the hand of Mary now began to gain ground. He was one of the foremost in urging her to consent to a divorce, and he was certainly a leader in the conspiracy for Darnley's murder. Prosecuted by Darnley's father, the earl of Lennox, he was acquitted after a shamelessly partial trial, and shortly afterward his lands and offices were confirmed to him by a statute alluding to the queen's appreciation of his "gret and manifold gude service" to her and the nation. The day after the closing of parliament a number of leading nobles met at Ainsley, and drew up the paper called "the Ainslie Bond," whereby they expressed their approval of Bothwell's acquittal, proposed his marriage with the queen, and agreed to aid him in attaining this object and to defend it when attained. On April 24, 1567, as Mary was on her return from Stirling, Bothwell with a large body of men met her near Linlithgow, at Almond bridge, and overpowering her party carried her away to his castle of Dunbar, whether with or without the queen's consent is a matter of dispute. Bothwell now succeeded in procuring a full divorce from his wife, and in May he brought the queen to Edinburgh, where the bans of his marriage with her were published. On May 12 Mary, after she had solemnly declared that she was influenced only by her own will, signed a full pardon of Bothwell and his allies for their abduction of herself. She also created Bothwell duke of Orkney, and on May 15 was married to him at Holyrood. This step aroused the popular indignation to the point of armed resistance. The hostilities which followed in June culminated in the surrender of Mary at Carberry hill, and Bothwell fled to Dunbar, whence, being deserted by his former allies, and ordered to leave the country within twelve days, he took refuge in the Orkney islands. Pursued for acts of piracy committed in expeditions which he undertook, he fled to Den-

mark, and after a short period of impunity was imprisoned in the castle of Malmö, then belonging to the Danish king. Here he spent the remaining years of his life.

BOTOCUDOS (Port. *botoque*, a barrel bung), the name given by the Portuguese to a tribe of Tupayas Indians of Brazil, from their custom of wearing flat disks of wood in slits cut in the ears and under lip. By the coast Indians they were called Aymborés or Aimorés. According to tradition, they were driven from the north, and took up their habitation W. of a mountain range since called after them Serra dos Aymborés, separating the present provinces of Espirito Santo and Bahia from that of Minas Geraes. They call themselves Engereckmung, the signification of which is unknown. In Espirito Santo and Bahia they are commonly called Bugres, derived by Tschudi from the French, but apparently without warrant. They rarely approached the seashore, but in their occasional descents they gained a terrible reputation among the coast tribes, who regarded



Botocudos.

them with horror and as irrational beings, unskilled in the arts of hut building and of decorating their persons with feathers and other gaudy trappings. So strong was their antipathy to water, that their intended victim might always find safety by plunging into a river. They are of medium height, broad-shouldered, large-bodied, and muscular, their legs and arms, nevertheless, appearing soft, thin, and effeminate. There is a great variety of features among them, but in general they have low foreheads and small, black, piercing eyes, the exterior angles of which are usually oblique as in the Mongolian race, but blue eyes are not infrequent; small noses, at times somewhat arched at the base, especially in the women, and with wide aëæ; small mouths; the lips are usually thick, though some individuals have very thin lips. Their cheek bones are much less prominent than in their neighbors of the Tupi-Guaraní family. The hair on the head is thin, and when not allowed to fall over the forehead is

shaved with a bamboo razor for about two inches from the edge all round. The beard, naturally deficient, is commonly plucked out. The skin is a whitish yellow; and it has been affirmed that the Botocudos are capable of blushing. The women have the abdomen very large, the breasts flaccid and pendent, and are frequently bow-legged. All the hard work falls to their lot; they are the slaves of their husbands, who treat them with the utmost cruelty, beating them unmercifully and even cutting them with knives. Children while young are often treated with tenderness, and yet it is not unusual for the mothers to sell them to planters, who in reality hold them as slaves; but these rarely reach maturity. As a race, the Botocudos are decidedly ugly, exceptions to this rule being rare even in the young women. It has been erroneously stated that the Aymborés painted their bodies as other Indians do. They were formerly in the habit of varnishing their skin with the yellowish sap of certain trees, which gave them the appearance of having jaundice; but the intention was not to beautify but to preserve their bodies from the attack of mosquitoes and other insects. Their weapons consist of a bow about six feet long, so strong that none but an Indian can use it, and arrows of great length, sometimes barbed, with a sharp-pointed bamboo head, hardened in the fire. Their mode of combat is by attacking at night and from ambush. According to current belief, they were cannibals, and it is certain that after battle they ate the bodies of the slain, and that these feasts were conducted with great ceremony. They are fond of amusement, and have nothing of the stolid gravity of the northern Indians. Among their articles of diet are the larvae of certain insects, ants, alligators, lizards, the boa constrictor, monkeys, the ounce and other carnivora, tapirs, and ant-eaters. The Botocudos have been considerably reduced in number by European vices, and above all by the passion for strong drink, by disease, and by the war of extermination unceasingly waged against them by the whites. Of those still existing, some are domesticated and divided into several small bands, each of which has its separate headquarters, called *aldeamentos*, or villages; others have resisted all efforts to civilize them, and roam in freedom through the forest. All of them inhabit the region between the Rio Doce and Rio Pardo, and watered by these rivers and the Mucury and Belmonte. They all go naked, except civilized ones when they visit the *fazendas* or plantations; and these close up the slit in the lip with wax. The ear plug is often four inches in diameter, and that for the lip two inches; but the custom of wearing them appears to be going out, and is only persevered in by the adult females. Old women always lack the lower incisors, which have been dislodged by the pressure of the plug; in many cases even the alveolæ have totally disappeared, leaving the bone bare and as sharp as a knife. The

Botocudo language is entirely different from the various Tupi tongues, and has dialectic differences observable in each band. It is rich in reduplicated words, but possesses no gutturals or sibilants, and is generally spoken in a high key, very rapidly, and apparently indistinctly.

BOTOSHAN, or *Botashani*, a city of Roumania, in Moldavia, on the Shiska, an affluent of the Pruth, 60 m. N. W. of Jassy; pop. in 1866, 28,117. It is irregularly built, and contains 1 Armenian and 14 Greek churches, 10 synagogues, and a hospital. It has a considerable trade, especially in cattle, and is the seat of the most important fair in Moldavia.

BOTS, the larvae of a species of gadfly, *gasterophilus equi*. The females deposit their eggs on the sides and legs of horses, where a glutinous fluid attaches the eggs to the hair. The horse in licking himself breaks the eggs, and a small worm adheres to the tongue, and is conveyed with the food into the stomach. There it clings firmly to the cuticular portion of the stomach by means of a hook on either side of its mouth, feeding on the mucus during the winter, and passing out with the chyme at the end of spring, by which time it has attained a considerable size. The larva buries itself in



Bot Fly.

the ground, becomes a chrysalis, and in a few weeks is changed into a fly. The bots cannot, while they inhabit the stomach of the horse, give the animal any pain or cause any injury; for he enjoys the most perfect health while the cuticular part of his stomach is filled with them, and their presence is not suspected until they appear at the anus. They cannot be removed by medicine, because they are not in that part of the stomach to which medicine is usually conveyed; and if they were, their mouths are too deeply buried in the mucus for any medicine that can safely be administered to affect them; in due course of time they detach themselves and come away. When, after death, the coats of the stomach are found to be corroded and perforated, and when bots are found either in the perforations or already passed through them, other causes have destroyed the stomach. Horses are frequently injured, however, by the medicines which are ignorantly given to remove the bots. This will easily be understood, when it is stated that bots have lived for many days together in olive oil, and even in oil on turpentine, and that tobacco and nitrous and sulphuric acids do not immediately kill them.

BOTTA. **I. Carlo Giuseppe** Englelmo, an Italian historian, born at San Giorgio del Canavese, Piedmont, Nov. 6, 1766, died in Paris, Aug. 10, 1837. He was educated as a physician at the university of Turin, and also studied literature, botany, and music. In 1792 he was imprisoned for an alleged political offence, and, though nothing could be proved against him, he was

subjected to a rigorous confinement for 17 months. After his release he went to France, and was employed as surgeon in the army. Toward the close of 1796 he was sent to the Venetian islands of the Adriatic, where he wrote a "Historical and Medical Description of the Island of Corfu." In 1798 he was appointed a member of the provisional government of Piedmont, which was soon overthrown by the Austro-Russian invasion. He returned to France, was restored to his rank in the army, after the battle of Marengo became a member of the council which, with six commissioners, was to reorganize and administer the government of Piedmont, and a few months later, when a new government was instituted, he was one of the three commissioners who formed the executive. After the annexation to France in 1802 he became a member of the council of general administration, and published his *Précis historique de la maison de Savoie et du Piémont*. In 1804 he was chosen to the legislative body, and for some years was a resident of Paris. The first edition of his *Storia della guerra dell' indipendenza degli Stati Uniti d'America* (4 vols. 8vo) appeared in Paris in 1809-'10, was immediately reprinted in Italy, without compensation for want of a copyright law, passed through several editions, and was translated into English by George Alexander Otis of Boston (2 vols., 1826; new eds., New Haven, 1884 and 1840, and Cooperstown, 1848). In 1808 he was chosen vice president of the legislative assembly, and reelected to the same office the following year. In 1816 he published an epic poem in 12 cantos, entitled *Il Camillo, o Vejo conquistata*. In 1817 he was made rector of the academy at Rouen, where he remained till 1822. There he wrote his second history, the *Storia d'Italia del 1789 al 1814*, but it was not till 1824 that he was able to publish it. This, too, was immediately republished in Italy. In 1825 he wrote in French a general history of Italy for a popular library (3 vols.). The assistance of friends enabled him to connect his history of Italy with the great work of Guicciardini. He thus completed in five years the 10 volumes of the history of Italy from 1532 to 1789 (*Storia d'Italia continuata da quella del Guicciardini sino al 1789*, Paris, 1832). This was the last of his works. In the latter part of his life he received from Charles Albert a pension at first of \$600, and afterward of \$800. II. **Paul Émile**, a French archaeologist, son of the preceding, born about 1800, died at Achères, near Poissy, April 18, 1870. He made in his youth a voyage round the world, and formed on the W. coast of America a collection of natural curiosities. He accompanied as physician the expedition of Mehemet Ali to Sennaar, 1830-'38, and made a rich zoological collection. He was then appointed French consul at Alexandria, and in 1837 made another journey, the results of which he published in the *Relation d'un voyage dans l'Yemen* (Paris, 1844). In 1848, being consular agent at

Mosul, he began the excavation of Assyrian antiquities from the mounds on the banks of the Tigris, and published in 1848 *Écriture cunéiforme assyrienne*. The French government commissioned several eminent men to assist him in the preparation of *Monuments de Ninive, découverts et décrits par P. É. Botta, mesurés et dessinés par E. Flandin* (5 vols., Paris, 1849-'50), which was translated into English ("Letters on Discoveries at Nineveh," London, 1850 *et seq.*). Many of the discovered monuments were transported to Paris, and placed in the Louvre. Botta laid the foundation for the more important labors of Layard. In 1846 he became consul at Jerusalem, and in 1857 at Tripoli, where he remained till 1868.

BOTTA. L. Vincenzo, an Italian scholar, born at Cavaller Maggiore, in Piedmont, Nov. 11, 1818. He was professor of philosophy in the royal and national colleges of Turin, and in 1849 became a member of the Sardinian parliament. With Dr. Paroli he prepared a valuable work on public education in Germany (*Pubblico insegnamento in Germania*), which was published at the expense of the Italian government. Two parts of it were written by M. Botta and the third part by Dr. Paroli. Subsequently he settled in the United States, where he was naturalized, and has been for several years professor of Italian in the university of New York. His writings include *La questione Americana* (1861), "Discourse on the Life of Count Cavour" (1862), and "Dante, as Philosopher, Patriot, and Statesman" (1865). II. **Anne Charlotte Lynch**, wife of the preceding, an American poetess, born at Bennington, Vt. Her father belonged to the association of United Irishmen, participated at the age of 16 years in the rebellion of 1798, was by reason of his youth offered pardon if he would swear allegiance to the British government, refused, was imprisoned for four years, and then, being banished for life, settled in the United States. Miss Lynch was educated in Albany. In 1841 she published in Providence the "Rhode Island Book," a selection of prose and verse from the writers of that state. She soon after removed to New York, where her house became a resort of persons connected with literature and the arts. A collection of her poems was published in 1849, illustrated by eminent artists. Her principal prose work is a "Handbook of Universal Literature" (New York, 1860; 3d ed., 1878). She was married to Prof. Botta in 1855.

BOTTARI, Giovanni Gaetano, an Italian prelate, born in Florence, Jan. 15, 1689, died in Rome, June 8, 1775. He was director of the grand-ducal press of Tuscany, professor of ecclesiastical history and controversy in the Sapienza, and subsequently keeper of the Vatican library. He was principal editor of the new edition of the *Vocabulario della Crusca* and of the celebrated Vatican Virgil (1741).

BOTTESINI, Antonio, an Italian composer and contrabassist, born at Crema, Dec. 24, 1823.

He was taught the double bass in Milan by Luigi Rossi, according to the method of Andreoli and Dragonetti, and studied composition under several distinguished masters. When scarcely 28, he was engaged as contrabassist for the Italian opera in Havana, and afterward became director of the company. During the five years of his stay in Havana he paid occasional visits to the United States, where he became famous as a virtuoso, his renown being confirmed by his success on his return to Europe in 1851. In 1853 he visited the United States with M. Jullien, and afterward accompanied Mme. Sontag to Mexico. Subsequently he became director of the orchestra at the Italian opera in Paris, where his opera *L'Assedio di Firenze* was performed in 1857. In 1868 he produced at Barcelona *Marion Delorme*, and in 1871 his *Ali Baba* was performed in London. In 1872 he directed the Italian opera in Cairo.

BÖTTGER, Adolf, a German poet, born in Leipsic, May 21, 1815, died there, Nov. 16, 1870. He studied at the university of Leipsic, and his father, the author of a German-English dictionary, instructed him in the English and other foreign languages. He translated Byron (1840), Pope (1842), Goldsmith's poems (1843), Milton's poetical works (1846), Ossian (1847), Shakespeare's "As You Like It," "Midsummer Night's Dream," and "Much Ado about Nothing" (1847), Racine's *Phèdre* and Ponsard's *Odyssée* (1853), and Longfellow's "Hiawatha" (1856). Among his principal poems are *Pausanias, Der Fall von Babylon, Habana, and Die Tochter des Kain*. One of his most idyllic productions is *Goethe's Jugendliebe*, a description of some of Goethe's love affairs. A complete edition of his original poetical, dramatic, and prose works has been published in Leipsic in 8 vols. (1864 et seq.).

BÖTTGER, Böttcher, or Böttiger, Johann Friedrich, a Saxon alchemist, born at Schleiz, Feb. 4, 1682, died in Dresden, March 13, 1719. His pretended discovery of the philosopher's stone resulted in the invention of Saxon porcelain. After various vicissitudes he gave the elector Augustus an account of his discovery, which is preserved in the archives of Saxony. The elector not availing himself of his suggestions, they were put in application by Count Tschirnhausen, who established a manufactory at Meissen in 1705, employing Böttger, who succeeded in producing with the reddish brown clay which abounds in the vicinity of Meissen a porcelain of remarkable beauty and solidity. After Tschirnhausen's death Böttger became in 1710 director of a manufactory, but was arrested shortly before his death for having offered to sell the secret of his art. Engelhardt wrote his biography (Leipsic, 1837).

BOTTICELLI, Sandro, an Italian painter, born in Florence in 1437, died there in 1515. One of his earliest frescoes, "St. Augustine in Ecstasy," is in one of the churches of Florence. He decorated for Sixtus IV. a chapel in the Vatican, and painted numerous figures of the

popes and three large frescoes. Among his masterpieces are "The Birth of Christ," now in a private collection in London, and a crowned Madonna in the gallery at Florence. He engraved the first 19 prints for the famous edition of Dante's *Inferno* printed at Florence in 1481. His devotion to Savonarola subjected him to much persecution.

BÖTTIGER. I. Karl August, a German archaeologist, born at Reichenbach, June 8, 1760, died in Dresden, Nov. 17, 1835. He was a teacher, and through Herder's influence became director of the Weimar gymnasium, and was well acquainted with Wieland, Goethe, and Schiller. In 1832 he was admitted to the French academy, after having been made director of the royal academy of knights in Dresden. Among his chief works are: *Sabina, oder Morgenaeonen einer reichen Römerinn* (2 vols., 2d ed., 1806), and *Griechische Vasengemälde* (1797-1800).

II. Karl Wilhelm, son and biographer of the preceding, born Aug. 15, 1790, died Nov. 26, 1862. He became eminent as a historian, and edited a posthumous work of his father, *Litterarische Zustände und Zeitgenossen* (2 vols., Leipsic, 1838). He contributed the history of Saxony to Heeren and Ukert's *Europäische Staatengeschichte*, and his *Allgemeine Geschichte für Schule und Haus und Deutsche Geschichte für Schule und Haus* passed through many editions. From 1821 till his death he was professor of history in Erlangen.

BÖTTIGER, Karl Wilhelm, a Swedish poet of German descent, born at Westerås, May 15, 1807. After extensive studies and travels, he became in 1845 professor of modern literature at Upsal. He has translated Tasso's *Gerusalemme* and Dante's *Divina Commedia* into Swedish, and written the biography of his father-in-law Tegnér, besides many religious and other poems, most of which are contained in his *Samlade Skrifter* (3 vols., Stockholm, 1856-'8). A selection of the latter has been translated into German.

BOTTLE, a hollow vessel, now generally made of glass or earthen ware, with a narrow neck. In ancient times, especially among the nomadic races, bottles were made of the skins of animals. Such are mentioned by Homer as being in use by the Greeks, Romans, and Egyptians. Herodotus describes the manner in which they were made by the Egyptians. The first distinct



FIG. 1.—Skin Bottles.

notice of them in the Bible is in the book of Joshua, where it is said the inhabitants of Gibeon "took old sacks upon their asses, and wine bottles, old and rent, and bound up." According to Chardin, the Persians preserve

wine in skins prepared with pitch, which prevents the imparting of an unpleasant flavor to the wine. In Spain various skins, and especially that of the goat, are still used for containing wine. The hide is stripped from the animal as entire as possible, and the various natural openings having been sewed up, with the exception of that of one of the legs, which is retained as a nozzle, the vessel is ready, after a certain preliminary curing of the skin, for the reception of the wine. The peculiar taste of Amontillado sherry is supposed to be due to its being kept in leather. The only word rendered bottle in the New Testament is *ἀκόα*, a skin or leathern bottle (Matt. ix. 17). In the Old Testament, however, earthen bottles are mentioned, as well as those made of skins. In the book of Jeremiah occurs the passage, "Thus saith the Lord, Go and get a potter's earthen bottle," &c. (xix. 1). Metal, earthen, and glass bottles were used in ancient times by the Egyptians, Assyrians, Greeks, and Etruscans. The Jews probably obtained their knowledge of them from the Egyptians. Re-



FIG. 2.—Egyptian Bottles. 1 to 7, glass; 8 to 11, earthenware.

maines of Egyptian earthen and glass vessels, of various forms and sizes, have been found, and shown to have been made at a very early period. There is a collection of these articles in the British museum, and of elegant vases, which are assigned to a time as far back as that of Thothmes III., about 1450 B. C. Glass bottles made several centuries B. C. were found at Babylon by Mr. Layard.—The manufacture of glass bottles, on account of the nature of the material, is necessarily very simple, although for the production of fine work great skill is required. Glass while in a plastic state will not admit of much contact with machinery or tools without having its molecular constitution so affected as to increase its liability to fracture. Therefore the finest bottles are blown, as they were in the earliest times, without the use of a mould, and with the aid of as few tools as possible; the operation being performed by simply gathering a proper quantity of molten glass upon the end of a metallic blowpipe, and forming it into shape by holding it in various positions while expanding it by blowing through the tube, and occasionally applying pressure

with some tool of very simple form. Generally, however, bottles are made with the use of a mould in which the glass is blown, because in this way time and labor are saved. Fig. 3



FIG. 3.—Mould.

shows the construction of a mould which is frequently used, especially in making small bottles and vials. It requires an extra hand, usually a boy, to open and shut it. For ordinary quart and pint bottles a mould is used with hinges at the bottom, and is closed by means of a lever which is moved by the foot of the operator. When this form of mould is used three hands are usually employed to make a bottle: one, a boy or apprentice, to gather the molten glass on the end of the blowpipe, one to blow the bottle and shape it in the mould, and a third to finish the neck and mouth and correct any defects in form. One person can perform the work, but not with equal economy of labor. The operation may be briefly described as follows: Gathering the proper quantity of molten glass upon the end of the blowpipe, which is a straight iron tube about five feet long, the gatherer hardens it to the blower, who rolls it rapidly into a convenient form on the surface of a smooth iron or stone table, called a marver, at the same time expanding it slightly



FIG. 4.—Marver.

with the breath, then blows it to a suitable size for the mould, the axis of which is vertical. He then closes the mould, applies his mouth to the blowpipe, and blows with sufficient force to make the glass fit the cavity, and to take the impressions of whatever designs may have been engraved upon it. The mould is then opened and the bottle removed by means of the blowpipe, to which it still adheres. A punty, as it is called, is then attached to the bottom, to hold



FIG. 5.

it during the finishing process. This punty is an iron rod, upon one end of which a small ball of red-hot glass has been gathered so that it will adhere to the bottle, and it is applied as in

fig. 5, the neck of the bottle being cut off by the application of a cold iron or a wet stick, accompanied by slight traction. The finisher takes it, and, seating himself on a bench, a, fig. 6, which has some resemblance to an arm chair without a back, finishes the neck and mouth.

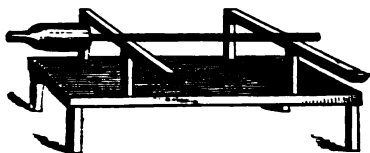


FIG. 6.—Finishing Bench.

Generally a band of molten glass is wound around the neck, at the mouth, which is then held in a flame till it attains the proper degree of pliability, and the shaping is done with one or more of the tools a, b, c, fig. 7. The chief

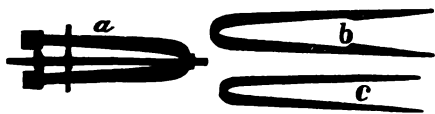


FIG. 7.—Finishing Tools.

use of the arms to the bench is to allow a rotary motion to be given to the bottle, by which it is held in position and its form retained. After the mouth is finished the punty is removed, and the bottle is received on a wooden rod or in a holder and taken to the annealing furnace, where it is placed upon a pan, which, with several others attached together in the form of a chain, is drawn slowly through a long, horizontal oven. When the pan arrives at the opposite end of the oven, its load of bottles is removed and it is returned to the mouth of the oven to receive a new load.—A patent was obtained by Henry Ricketts of Bristol, England, in 1822, for a machine for making bottles which was not unlike the moulds now in use, although more complex. It had a contrivance for forming the bottom by pressure from without, which is of no mechanical advantage, and only injures the texture of the glass. Other patents for slight alterations in moulds have been obtained, but their adoption causes but little change in the process of blowing, which, for reasons above stated, cannot receive much modification as long as glass is the material from which the bottle is made.—The various bottles used for different well known purposes are generally distinguished by peculiar shapes and sizes, as, for example, the English wine, beer, ale, and soda bottles, the French champagne, burgundy, and claret, and the Rhenish wine bottles. Port wine is occasionally put into very large bottles, called magnums, and acids in still larger, termed carboys. Demijohns are large bottles covered with wicker-work. The largest glass bottle perhaps ever manufactured was one blown at Leith, Scotland; its dimensions were 40 by 42 inches.

BOTTLE TREE (*sterculia* [*Delabecchia*] *rupestris*), an Australian tree of the family *sterculiaceae*. It has the calyx 5-cleft, usually colored; no petals; column of stamens with 15 or rarely 10 anthers; stigma peltate; carpels 5, distinct, with two or more ovules; narrow, digitate leaves; paniculate, axillary inflorescence; flowers unisexual or polygamous, the female flowers expanding first. The tree has a greatly expanded trunk, which is swollen to a disproportionate size. Where the ground is



Bottle Tree of Australia.

rocky this expansion is greatest just below the branches; but in favorable soils the foot of the tree is largest, forming a uniform cylindrical column, from whose summit the branches issue as from the neck of a bottle.

BOTTOMRY, in maritime law, a contract by which the owner of a ship, or the master as his agent, hypothecates or binds the ship as security for the repayment of money advanced for the use of the ship. The name is derived from bottom, that is, keel, a figure by which the vessel itself is designated. In form it is a bond, by which, in consideration of the money lent, the borrower undertakes to repay it if the ship accomplishes its voyage, and pledges the ship for the performance of the undertaking. If the ship should be lost, the debt would be lost, that is, so far as it depends upon the bottomry bond; and in consideration of this risk, a higher rate of interest may be agreed for than is allowed in other contracts. In case of partial damage to the ship, it is usually provided that the lender shall bear his proportion of it, which will be the proportion the amount lent bears to the whole value of the vessel. The lender is not entitled to possession of the vessel, not even when the debt becomes due (unless it should be so expressly stipulated in the bond), but may enforce payment of the debt by a decree of a court of admiralty for sale of the vessel. The master is not authorized to enter into this species of contract except in a case of necessity,

usually when the vessel is in some foreign port, and he has no other resources for obtaining the necessary supplies. It would impair the obligation of the bond if there were in fact means of getting such supplies without hypothecation of the vessel, and this was known to the lender. A bottomry bond is a pledge of the ship and freight; a *respondentia* bond is a pledge of the cargo; but both ship and cargo may be included in the same instrument. As respects the cargo there is not strictly a lien for the money lent, except in case of partial loss; but if the voyage is successfully performed, the obligation is merely personal, unless an express provision be inserted in the bond for a specific lien upon the goods.

BOTTS, John Minor, an American politician, born in Dumfries, Prince William co., Va., Sept. 16, 1802, died in Culpeper co., Jan. 7, 1869. After practising law a few years in Richmond, he settled on a farm in Henrico county. In 1833 he was elected to the state legislature, and was several times reelected. In 1839 he was returned to the 27th congress, and there advocated most of the points of Mr. Clay's programme—a national bank, a protective tariff, and the distribution among the states of the proceeds of the public lands. Though long a warm and intimate friend of John Tyler, Mr. Botts at once abandoned him on his secession from the whig party; and in the presidential election of 1844 he supported Mr. Clay. After serving two terms in congress, he was defeated in 1843, but was again elected in 1847. In 1852 he resumed the practice of law in Richmond. After the death of Mr. Clay, and the dissolution of the whig party, he became attached to the American party. He was opposed to the repeal of the Missouri compromise, and sympathized with those southern members of congress who resisted the passage of the Lecompton bill in 1858. In 1861 he endeavored to prevent the secession of Virginia, and throughout the civil war was inflexibly faithful to the Union. He was imprisoned for a few weeks in 1862, and his farm in Culpeper county, where he then resided, was several times devastated. After the war he published "The Great Rebellion, its Secret History," &c. (New York, 1866). He was one of the signers of the bail bond of Jefferson Davis (1867).

BOTZARIS. See **BOZZARIS**.

BOTZEN (Ital. *Bolzano*), a town of Tyrol, Austria, in the circle of Brixen, beautifully situated at the confluence of the Talfer and Eisack,



Botzen.

the latter of which empties into the Adige 2 m. below the town, and on the Brenner railway, 52 m. S. of Innsbruck; pop. in 1869, 9,357, chiefly Italians. It is surrounded by mountains and built in an Italian style, many streets being bordered with arcades. It is protected against inundations by a strong dike. In the parish church, a Gothic building of the 14th century, is a monument of the archduke Rainer. In the new cemetery on the E. side of the church is a fine monument by Schnorr. The wine of Terlau, produced in the vicinity, is celebrated, and the country abounds in other good wines and in excellent fruit. The principal articles of trade are silk, leather, and fruit, and there are four annual fairs, the situation of the town at the junction of the roads to Germany, Italy, and Switzerland producing great commercial activity. The weekly markets are especially interesting, owing to the variety of Tyrolese costumes.—The Roman citadel Pons Drusi probably occupied the site of Botzen.

BOUCHARDON, Edme, a French sculptor, born May 29, 1698, died in Paris, July 27, 1762. He was the son of an architect and sculptor, studied in Paris, obtained a prize in 1723, and spent ten years in Rome, where he executed busts of Clement XI. and other great personages. The king recalled him to Paris, where he successively became designer to the academy of fine arts, member of the academy, and professor. Among his principal works are a fountain in the rue de Grenelle, which still exists, and his bronze equestrian statue of Louis XV., which was destroyed in 1792. The museum of modern statuary in the Louvre contains a cabinet which bears his name, and his statues of Amor and of Christ. Caylus wrote his life (Paris, 1762), and Bardon, *Anecdotes sur la mort de Bouchardon* (1764).

BOUCHER, François, a French painter, born in Paris, Sept. 29, 1703, died there, May 30, 1770. He painted with remarkable facility,

and the number of his pictures and drawings is said to have exceeded 10,000, while at the same time he practised engraving. By pandering to the licentious taste of his times, he became fashionable and popular, and was called the painter of graces. For a long time after the first revolution his works were unsalable; but of late years they have again been sought for, especially by English amateurs, the gallery of the marquis of Hertford containing the erotic cabinet executed for Mme. de Pompadour. His most remarkable portrait is that of Mme. de Pompadour, and his best mythological picture, "Diana's Bath," is now in the Louvre.

BOUCHER, Jonathan, an English clergyman, born in Cumberland, March 12, 1738, died at Epsom, April 27, 1804. He went to Virginia about 1754 as a private teacher, afterward took orders in England, and was a rector in Virginia and Maryland till 1775, when he returned to England, his anti-revolutionary sentiments having given umbrage to his American congregation. From 1784 till his death he was vicar of Epsom. He is the author of "A View of the Causes and Consequences of the American Revolution, in 18 Discourses," dedicated to Washington (8vo, 1797), and of a "Glossary of Archaic and Provincial Words," intended as a supplement to Johnson's dictionary (A, 1802; A to G, 1807; enlarged ed., 1832).

BOUCHER, Pierre, sieur de Boucherville, a Canadian pioneer, born in Perche, France, in 1622, died at Boucherville, Canada, April 20, 1717. He came to America with his father in 1635, and was for many years Huron interpreter, and then rendered good services in the wars against the Iroquois, whom he repulsed frequently. He was deputed to France in 1661 to lay before the court the condition of the colony. This led to the publication of his little work entitled *Histoire véritable et naturelle des mœurs et des productions de la Nouvelle France* (Paris, 1663). He was ennobled for his services and made governor of Three Rivers in 1663, and received a grant of Boucherville, on which he settled in 1668. He was esteemed as a brave, pious, intelligent, and upright man, and, having reared a large family, is the ancestor of many of the best houses in Canada. "The Adieux of Grandfather Boucher," addressed in his last days to his children, is eminently characteristic of the man and the time.

BOUCHER DE CRÉVECEUR DE PERTHES, Jacques, a French archaeologist and author, born at Reims, department of the Ardennes, Sept. 10, 1788, died in Amiens in August, 1868. He belonged to an old family, and through the influence of his father, author of several botanical works and director of customs at Abbeville, he was employed by Napoleon on various missions to foreign countries. By a royal decree of 1818 he was permitted to add the family name of his mother, De Perthes, who claimed descent from an uncle of Joan of Arc, to his own. He wrote several tragedies and a comedy, and published anonymously in the

interest of free trade *Opinion de M. Christophe, vigneron, sur les prohibitions et la liberté de commerce* (4 parts, 1831-'4). Subsequently he became president of the *société d'émulation* at Abbeville, made an extensive collection of Celtic and Roman antiquities, which he presented to the government, and acquired celebrity by his archaeological discoveries and by his work *De la création* (5 vols., 1839-'41). In 1841 he observed in some sand containing mammalian remains at Menchecourt, near Abbeville, a flint rudely fashioned into a cutting instrument; and during the formation of the *Champ de Mars* in the same locality, many of the since celebrated iron hatchets were found. He published his first work on the subject in 1846, *De l'industrie primitive, ou les arts et leur origine*, claiming that these implements belonged to the age of the drift; and his *Antiquités celtiques et antédiluviennes* (1847) contains many illustrations of the implements, and refers to remains found in the peat, which appear to have been the ruins of lake dwellings. He also wrote *De l'homme antédiluvien et de ses œuvres* (1860), and *Des outils de pierre* (1866). His miscellaneous writings comprise a novel and a volume of poetry; an alphabetical dictionary of passions and sensations entitled *Homme et choses* (4 vols., 1851); *Les masques, biographies sans nom*, being a collection of ethical disquisitions (4 vols., 1861-'4); *Sous dix rois, souvenirs de 1791 à 1860* (8 vols., 1862-'7); *Des idées innées* (1867); and numerous books of travel.

BOUCHES-DU-RHÔNE, a S. E. department of France, in Provence, on the Mediterranean, comprising the delta of the Rhône, bounded N. by the Durance and W. by the Rhône; area, 1,971 sq. m.; pop. in 1872, 554,911. The Rhône divides within the province into two branches, forming a delta called the island of Camargue, which is partly occupied by marshes and lagoons. On the north of the lagoons is La Crau, a dreary plain, mostly of gravel, stretching to Arles; during the summer it is entirely arid and waste, though in winter it furnishes pasture for sheep and goats. These flocks are sent to the mountains about the beginning of the spring, and return in the autumn. The horses and cattle are few and of poor breed. The quantity of corn gathered in the department is insufficient, while the produce of wine leaves a large surplus for export. Silkworms are raised in large quantities; and olives are cultivated on a great scale, being partly exported as fruit, and partly converted into oil. There are manufactories of soap, hosiery, and silk, sugar refineries, and oil mills. The trade is mainly carried on through the port of Marseilles, the capital. The department is divided into the arrondissements of Marseilles, Aix, and Arles.

BOUCICAULT, Dion, a British dramatist and actor, born in Dublin, Dec. 26, 1822. His father was a French refugee and a merchant in that city. He was sent to England to be edu-

cated as a civil engineer, under the guidance of Dr. Lardner, but devoted himself to the stage, and produced in 1841 his popular comedy of "London Assurance," at Covent Garden theatre. After the success of this play, he rapidly produced upward of 100 pieces, either original or adapted from the French, including "Old Heads and Young Hearts," "Love and Money," "The Rich Heiress," "Love in a Maze," "The Corsican Brothers," "The Willow Copse," "Janet Pride," "The Phantom," and "Faust and Margaret." He excels in constructive power, knowledge of stage effect, and epigrammatic dialogue. In September, 1858, he visited the United States, and after delivering several lectures in New York, he resumed his profession, writing and playing "Jessie Brown," "The Octoroon," and "The Colleen Bawn." In 1860 he returned to London, and brought out at the Adelphi theatre "The Colleen Bawn," which proved successful. A French adaptation of this drama was performed in Paris in 1861 under the title of *Le Sac de Glenaston*. In 1865 he produced "Arrah na Pogue" with equal success. This drama was also translated for the French stage under the title of *Jean la Poste*. In the seven following years he brought forth the comedies and dramas "The Long Strike," "Hunted Down," "How She Loves Him," "Flying Scud," "The Rapparee," "Formosa," "After Dark," "Foul Play" (in collaboration with Charles Reade), "Lost at Sea," "Rip Van Winkle" (which Mr. Joseph Jefferson has rendered so popular), "Kerry, or Night and Morning," "Elfie," and "Babil and Bijou." In the summer of 1872 he entered into partnership with Lord Londesborough and became the manager of Covent Garden theatre; and in the autumn of that year he made, together with his wife (Agnes Robertson), a second professional visit to the United States.

BOUDINOT, Elias, an American patriot, born in Philadelphia, May 2, 1740, died in Burlington, N. J., Oct. 24, 1821. He was descended from a family of French Huguenots, studied law, commenced practice in New Jersey, was early a devoted advocate of the patriot cause, and in 1777 was appointed by congress commissary general of prisoners, and during the same year was elected a member of congress. In 1782 he became president of that body, and as such signed the treaty of peace. In 1789 he resumed the practice of the law, but in 1796 was appointed by Gen. Washington superintendent of the mint, which office he held till 1805, when he resigned all public employments and retired to Burlington. He became a trustee of Princeton college in 1805, and endowed it with a valuable cabinet of natural history. In 1812 he became a member of the American board of commissioners for foreign missions, and in 1816 was made the first president of the American Bible society. To these and other institutions he made munificent donations. He was the author of several works, including

"The Star of the West, or an Effort to discover the Lost Tribes of Israel," in which he seeks to show that the American aborigines are Hebrews.

BOUET-WILLAUMEZ, Louis Édouard, count de, a French naval officer, born near Toulon, April 24, 1808, died in Paris, Sept. 10, 1871. He left the naval school in 1829 with the grade of ensign, became lieutenant in 1835, served in South America and at the bombardment of Mogadore, and was employed in 1838 in surveying the W. coast of Africa. In 1844, having attained the rank of captain, he was appointed governor of Senegal, where he remained till 1847. During the Crimean war he served as rear admiral, after which he was maritime prefect successively of Cherbourg and Toulon, commanding the Mediterranean squadron, and was promoted to be vice admiral. In 1865 he was made senator; and in 1870 he commanded the French squadron in the Baltic. He published *Description nautique des côtes comprises entre le Sénégal et l'équateur* (1849); *Campagne aux côtes occidentales d'Afrique* (1850); *Batailles de terre et de mer* (1855); and *Tactique supplémentaire à l'usage d'une flotte cuirassée* (1865).

BOUFARIE, a town of Algeria, in the centre of the plain of Metidja, 16 m. S. by W. of Algiers; pop. in 1866, 5,267, about half Europeans. In 1832 Gen. d'Erlon established here an entrenched camp in the midst of a malarious swamp, and the early colonists suffered much from fevers; but by means of draining, the district has been rendered one of the most healthy and fertile in Algeria, producing the mulberry tree, grain, fruit, cotton, and tobacco. The town carries on an extensive trade, and is the seat of a large fair. Being upon the direct route from Algiers to Blidah and Oran, it is an important military post.

BOUFFÉ, Marie, a French comedian, born in Paris, Sept. 4, 1800. He was a mechanic previous to going on the stage. For 40 years he was one of the first French comic actors, especially excelling in vaudevilles. In 1855 he was much admired at the Varieties theatre in Paris in the *Abbé Galant*, and in 1857 in *Jean le Toqué*. Since 1864, when he gave his farewell performance, he has only played once at the Gymnase theatre, in 1866, in *La fille de l'avare*.

BOUFLERS, Louis François, marquis, afterward duke de, a French soldier, known as the chevalier de Boufflers, born Jan. 10, 1644, died at Fontainebleau, Aug. 22, 1711. He distinguished himself during the retreat of the French army before Montecuculi in 1675, and was created marshal in 1698. In 1708 he successfully withstood a siege in Lille for three months. At Malplaquet (1709) he served as a volunteer under his junior, Marshal Villars. When the latter was wounded, Boufflers was constrained to retreat; but he succeeded in saving all the guns, and left only 80 prisoners in the hands of the enemy.

BOUFLERS, Stanislas, marquis de, first known as the abbé, then as the chevalier de Bouflers, born at Lunéville in 1737, died in Paris, Jan. 18, 1815. His mother, who died in 1787, was one of the celebrities of the court of Stanislas Leszczynski, at Lunéville. His wit and elegant manners and his poetical talents rendered him a favorite at the court of Louis XV. He was a member of the constituent assembly (1789), and afterward went to Berlin, where he received from the king a grant of lands in Prussian Poland, to establish a French colony; but the plan failed. He married Mme. de Sabran and returned to France in 1800, and in 1804 was admitted to the French academy. He was a fervent eulogist of Napoleon, and was ridiculed for his extravagant praise of Jerome Bonaparte. The best collection of his works is that of 1828, in 2 vols., including his excellent "Letters from Switzerland."

BOUFLERS-ROUVREL, Marie Charlotte Hippolyte, countess de, born in Paris in 1724, died about 1800. She was a daughter of the count de Camper-Saugeon, and married the count de Bouflers-Rouvrel, who died in 1764; after which she led a gay life at the court of the duchess of Orleans, and was the reputed mistress of the prince de Conti, over whose receptions she presided. After the prince's death she retired to Auteuil with her daughter-in-law the countess Amélie de Bouflers, afterward the duchess de Lauzun, who was guillotined June 27, 1794, and she herself was imprisoned until after the fall of Robespierre. She was intimate with Rousseau, and in correspondence with him 16 years, and was the friend of Hume, Grimm, and other celebrities. Walpole, in his partiality for Mme. du Deffand, decried Mme. de Bouflers, though the latter was regarded as one of the most intelligent women of her day.

BOUGAINVILLE, Louis Antoine de, a French soldier and navigator, born Nov. 11, 1729, died Aug. 31, 1811. He entered the military service as aide-de-camp to Chevert, and at the age of 25 published a treatise on the integral calculus. In 1754 he went to London as secretary of the French embassy; in 1756 he served in Canada as aide-de-camp to Montcalm, after whose death he returned to France. In 1761 he displayed such courage in the campaign on the Rhine, that he received from the king two guns which he had taken from the enemy. Peace being concluded, he entered the navy, and undertook to establish a French colony in one of the Falkland islands. Compelled to relinquish this settlement on account of the objections of Spain, he sailed southward, passed through the straits of Magellan, and entered the South sea, which was still for the most part unexplored. He looked in vain for Davis's land, then steered through the Paumotu archipelago, where he discovered several yet unknown islands, arrived at Tahiti, April 6, 1768, gave the name of Navigators' islands to the Samoan archipelago, and touched the part of the cluster which received a few years later from Capt. Cook the

appellation of New Hebrides. He then reconnoitred the E. coast of Australia, doubled the Louisiade islands, passed the large Solomon's archipelago, which had not been visited since its discovery by Mendana, and put in at Port Praslin, New Ireland, where he repaired his ships. He then took his course westward, discovering on his passage some small islands, and passing the N. shore of New Guinea. Finally he reached Booro, one of the Moluccas, where he procured a fresh supply of provisions, and in March, 1769, reached St. Malo, after a cruise of over two years. In 1771-'2 he published his *Voyage autour du monde* (2 vols., Paris), a very interesting account of his adventures, with a graphic description of the countries he had visited; it was immediately translated into English, and in 1788 into German. Bougainville had scarcely completed this work when he planned a voyage to the north pole; he wrote a memoir on the subject, proposing two distinct routes, and submitted it to the royal society of London, of which he had been admitted a member. In 1778, when the French took part in the American war of independence, Bougainville was appointed to the command of a ship of the line, and distinguished himself in all the engagements between the fleets of France and England. In the conflict in which De Grasse was defeated by Admiral Rodney, April 12, 1782, the *Auguste*, the ship commanded by Bougainville, suffered most severely, but maintained its station in the line to the last extremity; when no hope of retrieving the fortune of the day was left, by a judicious and decisive movement he succeeded in rescuing eight sail of his own immediate division, which he conducted safely to St. Eustace. Returning to France, he resumed his project of a voyage in the arctic seas, but received no encouragement, and finally left the naval service in 1790. In 1795 he was elected to the French institute, and subsequently became a member of the board of longitudes. On the organization of the senate, he was made a member of that body by Napoleon, who also ennobled him.

BOUGHTON, George H., an American painter, born in Norfolk, England, in 1836. His family removed to the United States about 1839, and he passed his youth at Albany, N. Y. He early developed a taste for drawing both figures and landscapes, and in 1853, having painted a few pieces which found a ready sale, he went to London and passed several months in the study of his art. Upon returning to America he settled in New York, and soon became known as a clever and rising landscape painter. Two of his works produced at this time, "Winter Twilight" and the "Lake of the Dismal Swamp," are noticeable for neatness of execution combined with no little poetic sentiment. They indicated a transition period from landscape to *genre* painting; and to fit himself for the latter he visited Paris in 1859 and devoted two years to study. In 1861 he opened a studio in London,

where he has since mostly resided, contributing annually to the royal academy exhibitions. His works are of cabinet size, and represent generally *genre* subjects in connection with landscapes. Though partaking somewhat of the mannerisms of the French school, they are often original in conception, and in respect to composition and imaginative power entitle the painter to take high rank among contemporary artists. Among the most successful are several depicting French peasant life, such as "Passing into the Shade," "Coming from Church," "Cold Without," and "Morning Prayer." On American subjects he has painted "The Scarlet Letter," "Return of the Mayflower," and "Puritans going to Church." Among his later works are "Reading Clarissa Harlowe," "Colder than Snow," and "The Idyl of the Birds," the last named a composition in three parts, refined in execution and infused with a singular pathos. Mr. Boughton is most successful in his female figures, which are always interesting and sometimes strikingly beautiful in features and expression. Of late years he has habited them in the long, narrow dress of about 1810, but without the eccentric accessories belonging to the fashion of that time.

BOUGIAH (anc. *Saldæ*; Fr. *Bougie*; Arab. *Bujayah*), a town of Algeria, capital of the province of Kabylia (created in 1873), beautifully situated in a mountainous region, about 112 m. E. of Algiers, on the W. coast of the gulf of Bougiah, which extends from Cape Carbon to Cape Cavallo; pop. in 1866, 2,836. On the summit of the principal mountain is a French fort, on the site of a former place of pilgrimage, which had earned for the town the title of Little Mecca. There are several other forts, and the town contains churches, mosques, a school, a hospital, an asylum for children, and a number of barracks. The roadstead is the safest on the coast of Algeria, and there is an active trade in oil, grain, wine, oranges, honey, and especially in wax.—The ancient *Saldæ* was a Roman colony of Mauritania Sitifensis under Augustus, and it was afterward the seat of a bishop. In the 5th century it became the capital of Genseric, king of the Vandals, and in the 8th it fell under Arab domination. As the residence of a powerful caliph it became in the 10th century, under the name of Bujayah, the chief emporium of N. Africa, and retained this prosperity under the subsequent rule of Morocco and of Tunis. An active trade was carried on with Italian merchants, especially with the Genoese, who erected here many public buildings. In the 15th century piracy injured the character of the place; and Spanish domination early in the 16th century brought about a decline, which under Turkish rule in the 17th culminated in utter ruin, from which the town has only partially recovered since 1833, when the French gained possession of it. It is the chief seat of trade with E. Kabylia.

BOUQUER, Pierre, a French physicist, born at Le Croisic, Feb. 16, 1698, died Aug. 15, 1758.

After holding a professorship of hydrography at Havre, he succeeded Maupertuis as associate geometer of the academy of sciences, and was afterward made pensioned astronomer. He accompanied La Condamine and Godin on the great South American expedition to measure an arc of a meridian near the equator, and on his return he published *Théorie de la figure de la terre* (Paris, 1749). His other works are on optics, astronomy, and navigation. His principal claims to fame are his invention of the heliometer, and his foundation of the science of photometry, which is most fully expounded in his posthumous *Traité d'optique sur la gradation de la lumière*, edited by La Caille (Paris, 1760).

BOUQUEREAU, Guillaume Adolphe, a French painter, born at La Rochelle, Nov. 30, 1825. He studied in the Paris school of fine arts, and has been prominent since 1855 among the artists of the modern French school. He executed the mural paintings in the St. Louis chapel of the church of Ste. Clotilde, and in the church of St. Augustine. His "Triumph of Venus" (1856) has been popularized by many engravings and lithographic drawings. There are many of his pictures in the United States.

BOUILLE, François Claude Amour, marquis de, a French general, born Nov. 19, 1739, died in London, Nov. 14, 1800. He distinguished himself in the seven years' war, was appointed governor of Guadeloupe in 1768, and at the beginning of the American war of independence was governor general of the French Antilles. He not only preserved those islands against the English, but succeeded in taking several others from them. At the same time he displayed such magnanimity that on visiting England at the conclusion of peace he received there public tokens of admiration. In the first years of the revolution he was in command of the eastern military division of France, and ably contended with great difficulties arising from the rebellious disposition of the population and the mutinous spirit of the troops. When Louis XVI. projected his flight from France, he consulted Bouillé, who entered into the plan and made all the necessary preparations; but notwithstanding all the efforts of the general, the king was arrested at Varennes (June 21, 1791). Bouillé thereupon fled from France and went afterward to Russia, where Catharine II. promised him an army of 30,000 men to invade France; but the promise was never fulfilled, and Bouillé repaired to England, where he wrote his excellent *Mémoires sur la révolution française*, first printed in English at London in 1797, translated into German (Hamburg, 1798), and not published in French till 1801.

BOUILLET, Marie Nicolas, a French metaphysician and encyclopædist, born in Paris, May 5, 1798, died there, Dec. 28, 1864. He was for 20 years professor of metaphysics and ethics in various colleges, and became honorary councillor of the university in 1850, inspector of the academy of Paris in 1851, and permanent

inspector general of public instruction in 1861. He edited the philosophical works of Cicero and Seneca, and the works of Bacon (8 vols., 1834-'5), and prepared the first complete French translation of the *Enneads* of Plotinus (3 vols., 1857-'61), for which he received a prize of 3,000 francs from the French academy. He contributed to various cyclopædias, and was the chief editor of the *Dictionnaire classique de l'antiquité sacrée et profane* (2 vols., 1826), *Dictionnaire universel d'histoire et de géographie* (1 vol. large 8vo, 1842; 22d ed., 1871), and *Dictionnaire universel des sciences, des lettres et des arts* (8vo, 1854; 9th ed., 1870). The second of these works was modified in accordance with the requirements of the Roman congregation of the Index.

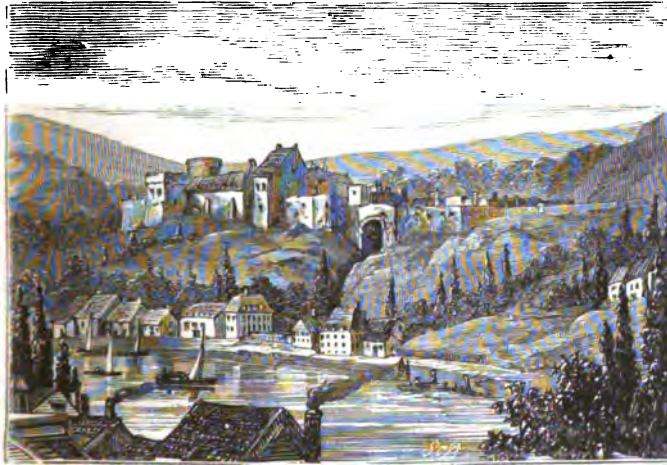
BOUILLIER, Françoise, a French philosopher, born in Lyons, July 12, 1813. He became professor and dean of the faculty, and in 1856 president of the academy of that city; and since 1867 he has been director of the superior normal school. He prepared French translations of some of the works of Kant and Fichte, and is the author of the *Histoire de la philosophie cartésienne* (2 vols., Paris, 1854; 2d ed., 1867).

BOUILLON, a town of Belgian Luxemburg, on the Semoy, 17 m. W. S. W. of Neufchâteau;

riage into the family of La Tour d'Auvergne, viscounts of Turenne. Bouillon was held by the French from 1676 to 1815. The title of prince of Bouillon was assumed in 1792 by Philip d'Auvergne, a captain in the British navy, and was borne by him until his death in 1816, when the contest between different claimants was set at rest by a decision (July 1) in favor of the French prince Charles Alain de Rohan-Guemené, whose posterity still bear the title. Bouillon has belonged to Belgium since 1831.

BOUILLON, Godfrey de, the hero of the first crusade, born in South Brabant about 1060, died in Jerusalem, July 18, 1100. He was the son of Eustace II. of Boulogne, brother-in-law to Edward the Confessor. In 1076 he succeeded his maternal uncle, Godfrey the Humpbacked, duke of Lower Lorraine, in a part of his possessions. He espoused the cause of the emperor Henry IV. in the memorable struggle with Pope Gregory VII., slew the rival emperor Rudolph of Swabia in the battle of Mölsen (1080), and a few years later planted Henry's banner on the walls of Rome, which he was the first to scale. In reward for these services he became duke of Lower Lorraine. The idea, however, that he had committed sacrilege by violating the city of St. Peter sat

heavy on his soul. As soon as the crusade was proclaimed, he mortgaged his lands to the bishop of Liège, in order to procure funds for the enterprise, and set out in the spring of 1096, with his brothers Eustace and Baldwin, for the Holy Land, at the head of 70,000 foot and 10,000 horse, French, German, and Lorrainers. Godfrey, who belonged to both the French and German nations, and spoke both tongues with ease, soon became the virtual leader of the whole vast expedition. (See *CRUSADES*.) He was not tall, but his strength was prodigious. It is said that



Bouillon.

pop. in 1866, 2,765. It has an ancient castle, and was formerly the capital of the lordship of Bouillon (which had been separated by partition from the county of Boulogne), a district in the Ardennes containing several large villages and about 20,000 inhabitants. This district was mortgaged by Godfrey the crusader, in 1095, to the bishop of Liège, whose successors held it till 1482, when it was taken by Guillaume de La Marek, prince of Sedan. Restored to the bishop by Charles V. in 1529, it was again taken in 1548 by Robert de La Marek, whose descendants were dukes of Bouillon, which title afterward passed by mar-

with one blow of his sword he clove asunder a horseman from head to saddle, and with one back stroke would cut off an ox's or camel's head. When in Asia, having one day lost his way, he found one of his companions in a cavern engaged with a bear; he drew the beast's rage upon himself, and slew it, but the serious bites he received kept him long in his bed. Alexis Comnenus agreeing to provide the western army with supplies on condition that the crusaders would expel the Turks from his dominions, Godfrey conquered Nicæa and in 1098 Antioch, where his soldiers were short of provisions, the Greek

emperor having failed to keep his promise. They regained their courage on the supposed discovery of the lance which pierced the side of the Saviour on the cross; and after a siege of 38 days, Godfrey, with only 20,000 men remaining of his army, captured Jerusalem, July 15, 1099. He tried, but in vain, to restrain the excesses of his soldiers, and a fearful massacre ensued. Elected king, he refused to assume a royal crown on the spot where the Saviour had been crowned with thorns, and, accepting only the title of duke and administrator of the Holy Sepulchre, surrendered to the patriarch the kingdom of Jerusalem, while he watched over the defence of the city, which was threatened by a vast Egyptian army. Godfrey soon died, probably of care and anxiety, after having founded a monastery in the valley of Jehoshaphat. He was buried on Calvary, and was succeeded by his brother Baldwin I., who assumed the title of king of Jerusalem. Godfrey's exploits have been celebrated by Tasso.

BOUILLON. I. Henri de la Tour d'Avvergne, duke de, marshal of France, born Sept. 28, 1555, died March 25, 1623. During the first part of his life he was known as viscount of Turenne. He received a military training under the superintendence of his grandfather, the constable de Montmorency. While still young he was converted to Calvinism, and became an adherent of Henry of Navarre. After his accession to the throne of France, Henry conferred on him the hand and estates of Charlotte de la Marek, the heiress of the duchy of Bouillon, and thus he became a powerful prince and assumed the title of duke de Bouillon. On the evening of his marriage, bidding adieu to his bride for a few hours, he stormed the fortress of Stenay, which was held by the Lorrainers. This made Henry say that he would make marriages every day if he could be sure of such wedding presents. He afterward participated in the conspiracy of Biron, and fled to Geneva, where he remained till 1606. During the regency of Maria de' Medici, Bouillon sometimes sided with the queen, sometimes with her opponents; now supporting the Calvinists, then making peace with the court. Yet he found time to establish at Sedan a large library and a college. After the death of his first wife he married Elizabeth of Nassau, daughter of William, prince of Orange, by whom he had two sons, the younger of whom was the celebrated Turenne. **II. Frédéric Maurice de la Tour d'Avvergne**, duke de, a French soldier, son of the preceding, born at Sedan, Oct. 22, 1605, died at Pontoise, Aug. 9, 1652. He was brought up in the Calvinistic creed, and learned the profession of arms under his uncles, Maurice of Nassau and Frederick Henry. In 1635 he entered the service of France, but six years later, from aversion for Richelieu, he joined the Spaniards. At the battle of La Marfée, July 6, 1641, fighting on the side of the count de Soissons, he displayed extra-

ordinary ability, but the withdrawal of the Spanish allies rendered victory useless. He then made peace with the cardinal, and was appointed lieutenant general, but the next year was arrested as an accomplice in the conspiracy of Cinq-Mars. He probably would have been executed if his wife, who was in possession of Sedan, had not threatened to deliver it up to the Spaniards. After the death of Louis XIII. he went to Rome, was converted to Catholicism, and placed in command of the papal troops. In 1649 he returned to France, where he actively participated in the civil war against Mazarin.

BOULLY, Jean Nicolas, a French dramatist and novelist, born about 1768, died in Paris, April 14, 1842. He wrote the texts of many operas, including *Le jeune Henri*, by Méhul, and *Les deux journées* of Cherubini. He was also the author of several comedies and dramas, and of collections of tales for young persons, which were translated into German.

BOULAINVILLIERS, Henri, count de, a French historian, born at Saint-Saire, Normandy, Oct. 11, 1658, died Jan. 23, 1722. He asserted that France as a nation was indebted for its power to the feudal system, which in his opinion was the "masterpiece of human genius." His *Histoire de l'ancien gouvernement de la France* (the Hague, 1727) set forth this theory, and he wrote many other works.

BOULDER, a N. county of Colorado, bounded W. by the Medicine Bow mountains; area, 600 sq. m.; pop. in 1870, 1,939. It is watered by affluents of the South fork of the Platte river. The chief productions in 1870 were 54,891 bushels of wheat, 21,060 of Indian corn, 71,183 of oats, 3,898 tons of hay, and 84,253 lbs. of butter. There were 877 horses, 1,847 milch cows, 3,219 other cattle, and 183 swine. Capital, Boulder City.

BOULDER. See **BOWLDERS**.

BOULÉ, Théodore, a French publisher, born Feb. 23, 1799. In 1833 he founded the *Estafette*, and owned this journal till 1858, when, after 18 suits against him for stealing articles from as many other journals, it was suppressed by the government. On Feb. 24, 1848, he published the *République*, announcing the establishment of a republic previous to the official proclamation to that effect. His establishment was sacked June 13, 1849, by the national guard, and in 1850 he was deprived of his license as publisher. His business became then the property of a joint-stock company, which up to 1852 had already attended to the printing of more than 200 journals. Among the daily and periodical journals with which Boulé was connected as printer or proprietor, or in other capacities, were the *Revue Britannique* (1836), *Patrie* (1843-'5), *Figaro* (1855), &c. He has amassed an immense fortune.

BOULLONGNE. I. Louis, a French painter, born in Picardy about 1609, died in Paris in June, 1674. He studied in Italy, and after settling in Paris about 1640, he became one of

the organizers of the academy of painting and sculpture, and was professor in that institution till his death. His principal works were executed for the cathedral of Notre Dame. **II. Ben**, son of the preceding, born in Paris in 1640 or 1649, died there, May 16, 1717. A pupil of his father, his early picture of St. John was placed by order of Colbert in the academy, and he studied in Rome as a pensioner of the king. His imitations of great masters were afterward often taken for originals. He became in 1677 a member and in 1678 professor of the Paris academy, and Louis XIV. employed him. One of his most famous paintings is the "Resurrection of Lazarus" in the church of the Carthusians. He also produced a number of etchings. **III. Louis de**, brother of the preceding, born in Paris in 1654, died there in November, 1733 or 1734. In his 18th year he obtained the great prize of the academy, and in 1675 he went to Rome as a royal pensioner. After his designs in imitation of Raphael the Gobelins prepared tapestry for the king's apart-

ments. In 1681 he was admitted to the academy, and in 1722 appointed designer of medals and devices for the academy of inscriptions, in 1723 rector of the academy of painting and sculpture, in 1725 its president, and about the same time first painter to the king, by whom he was ennobled. His paintings are highly esteemed. He also excelled as an engraver. **IV. Geneviève and Madeleine**, sisters of the preceding, respectively born in 1645 and 1646, died in 1708 and 1710. They studied under their father, and were both admitted at the same time to the academy of painting (1699), exhibiting on this occasion a joint production. They were good portrait painters.

BOULOGNE. **I. Boulogne-sur-Mer** (anc. *Gessoriacum*, subsequently *Bolonia*), a town of France, in the department of Pas-de-Calais, situated on the English channel, at the mouth of the Liane, 19 m. S. S. W. of Calais, and 180 m. N. by W. of Paris; pop. in 1866, 40,251, including nearly 7,000 English. The upper town, irregularly laid out, but well built, con-



Boulogne-sur-Mer.

tains two squares with fountains, and an old castle where Louis Napoleon was confined after landing here in 1840. Among other public buildings is a cathedral built in the modern Italian style between 1827 and 1867, on the site of the Gothic building which was destroyed during the revolution. The citadel was razed in 1690. The ramparts have been transformed into promenades, and E. of them are the grounds which were used as a military camp in 1854-'5, and on many previous occasions. The lower or new town, lying close to the harbor, and containing the chief commercial establishments, is better laid out and built than the old town. It has a fine bathing establishment opened in 1863, with a ball room and reading room, and contains also a famous museum, and a library with over 80,000 volumes. The harbor, though still deficient in depth, has been much improved, and consists of two large basins connected by a quay,

ships anchoring some distance off in from six to nine fathoms. A great deal of the prosperity of the town is due to its situation on one of the main routes between London and Paris, being less than six hours' journey from London via Folkestone and Dover, and about 4½ hours from Paris by the new railway through Amiens, opened in 1867. About 300 vessels belong to the town, a large proportion of them engaged in the Newfoundland cod fishery. The fishermen generally marry only among themselves, live in a separate part of the town, have a peculiar dress, and speak a distinct patois. Before going to sea they make votive offerings in the neighboring chapel of Jésus Flagellé. The foreign trade is chiefly in herring, mackerel, oysters, wine, brandy, coals, butter, and linen, wool, and silk goods. Over 3,000 vessels enter and leave the port annually, with an aggregate tonnage exceeding 500,000. The population has nearly doubled since 1815,

chiefly owing to the influx of English residents; and the town looks now more English than French. There are two British chapels and many English boarding schools. Le Sage and the English poets Churchill and Campbell died in Boulogne, and Sainte-Benve was born here. —Under the Romans the place was the port most frequented by travellers crossing to Britain. During the middle ages it was possessed by various princely houses, until it fell to that of Burgundy. In 1477 it was united to the French crown by Louis XI. In 1544 it was taken by Henry VIII. of England, but restored to France in 1550 on payment of 2,000,000 francs. It has been at various times the starting point of naval expeditions against England, and it was the centre of the great armament prepared by Napoleon for the invasion of that country. **II. Boulogne-sur-Seine**, a village of France, in the department of the Seine and arrondissement of St. Denis, on the right bank of the Seine, opposite St. Cloud, about 1 m. W. of the S. W. extremity of Paris; pop. in 1866, 17,348. It is famous for its bleacheries. Between Boulogne and the Porte Maillot of Paris is the Bois de Boulogne, originally a royal hunting ground. In the 13th century it contained the monastery of Longchamps, and subsequently was a celebrated forest till 1852, when it was converted into one of the finest pleasure grounds of Europe, covering nearly 2,500 acres. Among the most renowned features of the park were the deer park; the *rond des cascades*; the lakes; the *butte Mortemart*, an artificial mound; the *mare d'Auteuil*, a natural pond; the immense artificial rock-work called *cascade de Longchamps*, with the race course; the *pré Catalan*, with its concerts; the villa Haussmann, on the site of the old abbey of Longchamps; the zoological garden of acclimation; and the restaurant *château de Madrid*, called after the famous palace demolished under Louis XVIII. During the Franco-German war the trees were cut down by order of the military authorities of Paris, and the pleasure grounds otherwise devastated.

BOULTER, Hugh, an English prelate, born in or near London, Jan. 4, 1671, died in London in September, 1742. After leaving Oxford he was successively chaplain to the archbishop of Canterbury, rector of St. Olave's, Southwark, archdeacon of Surrey, chaplain to George I., and tutor to Frederick, prince of Wales. In 1719 he became bishop of Bristol and dean of Christ church, Oxford, and in 1724 archbishop of Armagh and primate of all Ireland. He expended £80,000 in augmenting the incomes of the poorer clergy, erected and endowed hospitals at Armagh and Drogheda for clergymen's widows, contributed to the establishment of charter schools, and during the famine of 1740 provided at his own expense two meals a day for 2,500 persons. For 19 years he filled the office of lord justice of Ireland. His "Letters to several Ministers of State in England relative to Transactions in Ireland from 1724 to

1788" (2 vols., Oxford, 1769-'70) are regarded as authority on that period.

BOULTON, Matthew, an English mechanician, born in Birmingham, Sept. 3, 1728, died near there, Aug. 17, 1809. He joined his father in the manufacture of hardware, and one of his first inventions was a new mode of inlaying steel. The death of his father gave him ample means to extend his business, and in 1762 he established the Soho manufactory near Birmingham, for which he in 1767 constructed a steam engine, on the original plan of Savery. In 1769 he entered into partnership with James Watt, and the Soho steam engine, gradually improved and simplified, became known all over Europe. It was first applied to coinage in 1783, from 30,000 to 40,000 milled coins being struck off in an hour. Boulton and Watt sent two complete mints to St. Petersburg, and for many years executed the entire copper coinage of England. Mr. Boulton expended £47,000 on the steam engine before Watt had so completely constructed it that its operation yielded profit. He also patented a method of raising water and other fluids by impulse.

BOU MAZA, an Arab chief, born in Algeria about 1820. He was a dervish, who in 1845 roused the population of the Dahra against the French, participating in many conflicts and co-operating with Abd-el-Kader in Morocco. On April 13, 1847, he was compelled to surrender to Saint-Arnaud and sent to Paris. A liberal pension was granted to him, and he was provided with handsome lodgings; but being caught in an attempt to leave Paris in the night of Feb. 23, 1848, he was removed to Ham and detained in the fortress till July, 1849, and in the city till 1852. He was sent to the theatre of war in the East in 1854, and commanded a corps of irregular troops, receiving in 1855 a colonelcy in the army.

BOURBAKI, Charles Denis Sauter, a French soldier, born in Paris, April 22, 1816. His father, of Greek origin, and an officer in the French army, lost his life in the Greek war of independence (1827). Bourbaki was educated at St. Cyr, became a sub-lieutenant in 1836, and brigadier general in 1854. He distinguished himself in the Crimean war at Alma and Inkerman, and on Sept. 8, 1855, during the storming of the Malakhoff. Subsequently he was on the staff of the governor general of Algeria, and in August, 1857, became general of division. In 1859 he increased his reputation at the battle of Solferino, and afterward held a command in Paris. In May, 1869, he commanded the second camp at Châlons, and in July became aide-de-camp of Napoleon III. After the outbreak of the Franco-German war, he was appointed in July, 1870, commander-in-chief *ad interim* of the guard in place of Bazaine, under whom he took an active part in the battles near Metz, Aug. 14, 16, and 18, and especially on Aug. 31 in the unavailing attempt to break through the German lines. He succeeded in escaping from Metz in the beginning

of October, and was reported to have been sent by Bazaine on a mission to the ex-empress Eugénie at Chiselhurst. The provisional authorities at Tours next placed him in command of the first army of the north at Lille; but while he was exerting himself to qualify the troops for active service, Gambetta remonstrated against his inactivity, and Bourbaki, after rebutting these charges, laid down his command. On Dec. 6, however, he was placed at the head of part of the remnants of the defeated army of the Loire, which he reorganized around Nevers, so as to make it consist of four corps and eventually of about 150,000 men. Disappointed by Garibaldi's force not joining him for the relief of Belfort and in other projected exploits, he succeeded, nevertheless, in driving the enemy from Dijon; but his adversary, Gen. Werder, concentrated his forces at Vesoul, attacked the French flank at Villesezel (Jan. 9, 1871), gained time to intrench himself in a strong position before Belfort, and repeatedly repelled Bourbaki's impetuous attacks (Jan. 15-17). Dreading at the same time German reinforcements under Manteuffel, the French general retired to Besançon in the hope of thence reaching Lyons; but, cut off by the Germans, he was obliged to retreat over the left bank of the river Doubs in the direction of Switzerland. In the mean while he received visionary instructions from Gambetta to resume aggressive operations with demoralized forces, worn out by forced marches over Alpine mountains and glaciers, and short of the necessities of life. Depressed by these circumstances and exasperated at Gambetta's taunting him with treason, Bourbaki shot himself in the head at Besançon, Jan. 27. Expressing his regret that the wound did not prove fatal, he transferred his command to Gen. Clinchant, who, after new disasters, led the remaining 80,000 of the original 150,000 men of Bourbaki's army into Switzerland. Bourbaki has since been appointed to a military command in Lyons.

BOURBON. I. A N. E. county of Kentucky, bounded E. by the South Licking river, which also intersects the N. E. part, and drained by Hinkston, Stoner's, and Stroad's creeks; area, about 400 sq. m.; pop. in 1870, 14,863, of whom 6,677 were colored. This county forms part of the region called the garden of Kentucky. The surface is gently undulating, and the soil, of fine limestone derivation, is remarkably rich. Lead ore is found in small quantities; sulphur and chalybeate springs are numerous. On Stoner's creek is a remarkable ancient earthwork. The Kentucky Central and the Paris and Maysville railroads traverse the county. The chief productions in 1870 were 71,717 bushels of wheat, 67,739 of rye, 1,229,515 of Indian corn, 114,762 of oats, 163,860 pounds of butter, 47,585 of wool, and 5,572 tons of hay. There were 5,214 horses, 5,119 mules and asses, 3,870 milch cows, 16,629 other cattle, 11,038 sheep, and 19,387 swine. The

manufacture of Bourbon whiskey, which takes its name from this county, is extensively carried on. Capital, Paris. II. A S. E. county of Kansas, bordering on Missouri, drained by the Little Osage and Marmiton rivers; area, 625 sq. m.; pop. in 1870, 15,076. The Missouri River, Fort Scott, and Gulf, and the Missouri, Kansas, and Texas railroads traverse it. The chief productions in 1870 were 145,179 bushels of wheat, 706,607 of Indian corn, 266,320 of oats, 81,527 of potatoes, 20,789 tons of hay, 12,108 of wool, 255,218 of butter, and 225,569 gallons of sorghum molasses. There were 5,428 horses, 5,299 milch cows, 10,055 other cattle, 4,302 sheep, and 6,867 swine. Capital, Bourbon.

BOURBON, an island. See RÉUNION.

BOURBON, a French ducal and royal family, different branches of which have reigned as kings over France, Spain, and Naples, and as sovereign dukes over Parma. I. **DUCAL FAMILY.** The fief of Bourbon, now called Bourbon-l'Archambault, was early in the 10th century in the possession of Adhémar or Aimar, a descendant of Childebrand, brother of Charles Martel, and in the 13th century in that of the house of Dampierre, which held it till 1272, when Beatrix, the heiress, married the sixth son of Louis IX., Robert, count of Clermont, who thus became the head of the family. The fief, then only a seignior, was erected into a dukedom by Charles IV. for Louis, son of Robert and Beatrix (1327). He left two sons: Pierre I., the elder, who continued the ducal dynasty, and Jacques I., count of La Marche, the ancestor of the royal line. The second duke, Pierre I., was killed in 1356 at Poitiers.—His son Louis II. (1387-1409) distinguished himself in the war against the English, and was appointed conjointly with Philip the Bold, duke of Burgundy, to superintend the education of the young king Charles VI., who had married his sister. He was the true founder of the greatness of his house. To the duchy of Bourbon and county of Clermont he added, through his two marriages or by purchase, the duchy of Auvergne, the county of Montpensier, the principality of Dombes, and several minor feudal estates; so that he became one of the most powerful vassals of the crown, his possessions extending from the Cher to the Rhône.—JEAN I. succeeded his father Louis II.; was taken prisoner at the battle of Agincourt (1415), and carried to England; paid his ransom three times without being released; and at last concluded a treaty by which he gave up to the English king the principal strongholds of his duchy, at the same time acknowledging Henry VI. as king of France; but his son declined to abide by these terms, and the duke died in 1434 in London, after 18 years' captivity.—CHARLES I., known until his father's death as count of Clermont, did good service for the French king against the English, and was one of the negotiators of the treaty of Arras between Charles VII. and the duke of Burgundy in 1435. He

subsequently engaged in the revolt known as *la praguerie*, but soon made his peace with the king, a daughter of whom his son, the count of Clermont, afterward married. He died in 1456.—**JEAN II.**, son of Charles I., was a faithful servant to Charles VII., but became the controlling mind of the *ligue du bien public* against Louis XI. By the treaty of Conflans he obtained favorable terms, being successively appointed governor of Languedoc, knight of St. Michael, and grand constable of France.—On his death in 1487 the duchy reverted to his eldest brother, the archbishop of Lyons, who died the following year, when their younger brother, **PIERRE II.** of Beaujeu, got possession of it. He married Anne, daughter of Louis XI. On the death of that king, Anne governed under the name of her brother, Charles VIII. Her only child was a daughter, Susanne, who married her cousin, **CHARLES** of Montpensier, the last duke, popularly known as the constable de Bourbon. He belonged to a younger branch of the family, and by his marriage with the heiress of the elder became the richest prince in France, and was appointed grand constable by Francis I. Louisa of Savoy, mother of the king, fell in love with him, but he repelled her advances. By her hostility he was deprived of his pensions, amounting to 76,000 livres; and on his wife's death, as she had left no child, Louisa claimed the Bourbon estates as the nearest of kin, and a lawsuit was brought against him. A judgment being rendered in her favor, Bourbon entered into secret negotiations with Charles V. and Henry VIII. It was agreed that a kingdom should be created for the constable in S. E. France, and the remainder of the country given up to the other confederates. Francis I. was informed of the plot, and Bourbon fled in disguise and raised in Germany 6,000 soldiers, with whom he entered the service of the emperor. He contributed greatly to the victory of Pavia, where Francis I. was taken prisoner. However, he was not treated by the emperor with the regard which he anticipated; and being at the head of a body of German mercenaries, who for months had received no pay, he was obliged to lead them against Rome. He was shot (May 6, 1527) while scaling the wall, upon which the soldiers stormed the city, which for two months was given up to pillage and bloodshed. His remains were removed to Gaeta, where a monument was erected to his memory; while the French parliament ordered the threshold of his mansion in Paris to be painted yellow, to signify that he had died bearing arms against his native country. **II. ROYAL DYNASTIES OF BOURBON.** 1. *France.* The head of the younger branch of the Bourbons, which gave kings to France, was Jacques, count of La Marche, second son of Louis, first duke of Bourbon. The sixth descendant of Jacques, Antoine de Bourbon, duke of Vendôme, married Jeanne d'Albret, the heiress of Navarre, by whom he had a son, Henri, prince of Béarn, born in 1553, who succeeded his father in 1562, and

in 1589, on the death of Henry III., the last prince of the Valois family, was the heir apparent to the crown of France. Henry the Béarnais, as he was called by the Catholics, made his claims good by courage, energy, and perseverance. At last, in 1594, he was acknowledged king of France as Henry IV., and was assassinated in 1610 by Ravallac. Six of his descendants in the direct line occupied the throne after him: Louis XIII., 1610–1643; Louis XIV., 1643–1715; Louis XV., 1715–1774; Louis XVI., 1774–1793; Louis XVIII., 1814–1824; and Charles X., 1824–1830. The reign of Louis XIV. lasted 72 years. This prince's sons and grandsons, excepting Philip, who was excluded on account of his accession to the throne of Spain, died before him, and he was succeeded by his great-grandson, then a child. Their two successive reigns covered together nearly a century and a half. The disorders and corruption which prevailed during the latter part of that period prepared the French revolution, to which Louis XVI. fell a victim. For more than 20 years his brothers were exiles from France; they returned to their country under the protection of foreign armies. Hence the comparative unpopularity of Louis XVIII. and Charles X., which caused at last the overthrow of the latter in 1830. The present head of this elder branch, and pretender to the throne (1878), is the count de Chambord, formerly duke de Bordeaux (called by his adherents Henry V.), the posthumous son of the duke de Berry, second son of Charles X., who was assassinated in 1820. The younger branch, known as Bourbon-Orleans, traces its origin to Philip, duke of Orleans, the brother of Louis XIV. It ascended the throne in 1830 in the person of his fourth descendant, who was styled Louis Philippe I., king of the French. He reigned 18 years, and lost his crown in the revolution of February, 1848. His surviving sons are the dukes de Nemours, Aumale, Montpensier, and the prince de Joinville. The present aspirant to the throne as the head of this branch is their nephew the count de Paris, the elder son of the last duke of Orleans, who was accidentally killed in 1842. 2. *Spain.* On the death of Charles II., the last prince of the Austrian house of Spain, the crown passed under his will to Philip, duke of Anjou, grandson of Louis XIV., who reigned as Philip V., 1700–1746. His successors were Ferdinand VI., 1746–1759; Charles III., 1759–1788; Charles IV., 1788–1808; Ferdinand VII., 1814–1833; and Isabella II., who lost her throne in 1868, and in 1870 renounced her claims in favor of her son Alfonso. 3. *Naples.* Don Carlos, the second son of Philip V. of Spain, obtained in 1734–'5 the crowns of Naples and Sicily, which he kept till 1759, when he ascended the throne of Spain as Charles III., transmitting his Italian crowns to his third son, Ferdinand IV., who on his restoration in 1815 styled himself Ferdinand I. of the Two Sicilies. He reigned 66 years, including the period of

the French invasion, and was succeeded by his son Francis I., 1825-1880, the father of Ferdinand II., who in 1859 was succeeded by his son Francis II., whose possessions were in the following year conquered by Victor Emanuel. His eldest son is Prince Louis, count of Trani, born in 1838. 4. *Parma*. The infante Don Carlos, before becoming king of Naples, had been for a time duke of Parma and Piacenza. In 1748, by the treaty of Aix-la-Chapelle, his younger brother Philip, son-in-law of Louis XV., was invested with the duchy of Parma, which he transmitted to his son Ferdinand, whose heir was Louis I. The last named in 1801 exchanged his duchy for Tuscany, which had been erected into a kingdom under the name of Etruria. His son Charles II. succeeded him in 1803, under the guardianship of his mother, Maria Louisa, daughter of Charles IV. of Spain. In 1807 the same princess, on the promise by Napoleon of another kingdom in Portugal, consented to a resignation for herself and son; but the promise was never fulfilled, and they had to be contented in 1815 with the hereditary duchy of Lucca. In 1847 Charles II. was again put in possession of the duchy of Parma by the death of the empress Maria Louisa, to whom it had been given by the congress of Vienna. In 1849 he abdicated in favor of his son Charles III., who had in 1847 married a French princess, Louise Marie Thérèse, daughter of the duke of Berry. On the assassination of Charles III. in 1854, his son Robert I. was proclaimed duke, under the regency of his mother, who died in 1864, after the annexation of Parma in 1859-'60 to the dominions of Victor Emanuel.—Among the houses derived from the royal Bourbon family of France, the most important are those of Condé and Conti.

BOURBON, Louis Henri, duke of, the great-grandson of the great Condé, born at Versailles in 1692, died at Chantilly, Jan. 27, 1740. After the death of Louis XIV. he was a member of the board of regency, and on the death of the regent, Philip of Orleans, he was appointed prime minister. He obtained large sums from the public treasury, was involved in the schemes of Law, and increased his fortune by various questionable transactions. He allowed his mistress, the marquise de Prie, to control political affairs, and incurred so much odium by imposing onerous taxes that Cardinal Fleury prevailed upon Louis XV. to exile him in 1726 to Chantilly.

BOURBON, Louis Henri Joseph, duke of, prince of Condé, grandson of the preceding, born Aug. 13, 1756, died Aug. 27, 1830. In his youth he fought a duel with the count d'Artois, afterward Charles X. In 1782, in the war between the English and French, he was wounded at the siege of Gibraltar. He was among the first to emigrate, served in the army of Condé, and on his return to France after the restoration recovered most of his hereditary fortune. His mistress, the baroness de Fenchères, as he had no offspring, induced him to settle his

fortune upon the young duke d'Aumale, son of Louis Philippe. On the outbreak of the revolution of 1830 he proposed to cancel his will, and to give all his fortune to Charles X.; but he was found strangled the next month, under circumstances which led to a legal investigation. No light was cast upon the matter, and it was judicially admitted that he had committed suicide. He was the last duke of Bourbon.

BOURBON-LANCY, a watering place of France, in the department of Saône-et-Loire, 20 m. N. W. of Charolles; pop. in 1866, 3,222. Its mineral springs, which are employed in nervous affections and rheumatism, were known to the Romans under the name of *Aquæ Nisineii*. A fine hospital was established here by the marquis d'Aligre.

BOURBON-L'ARCHAMBULT, a town of France, in the department of Allier, 15 m. W. N. W. of Moulins; pop. in 1866, 3,466. It is celebrated for its mineral springs and baths, said to be of great efficacy in cases of paralysis, rheumatism, and gun-shot wounds. It contains vestiges of the ancient castle of the Bourbon family, and was the capital of Bourbonnais.

BOURBONNAIS, a former province of central France, between the rivers Loire and Oher, now included chiefly in the department of Allier. It belonged for centuries to the ducal house of Bourbon, and was confiscated in 1523 by Francis I., and united to the French crown in 1531. Its ancient inhabitants were the *Ædui* and the *Bituriges Cubi*.

BOURBONNE-LES-BAINS (anc. *Aquæ Borvoniæ*), a town of France, in the department of Haute-Marne, 21 m. E. N. E. of Langres; pop. in 1866, 4,053. It has hot mineral springs, which were resorted to by the Romans. The temperature varies from 120° to 150° F. The water is principally employed in cases of paralysis and rheumatism, spasms, and ill-reduced fractures. There is a military hospital here.

BOURBON-VEKDÉE. See *NAPOLÉON-VEKDÉE*.

BOURDALOUE, Louis, a French prelate and orator, born at Bourges, Aug. 20, 1632, died in Paris, May 13, 1704. At an early age he entered the society of Jesus, and became professor of rhetoric, philosophy, and moral theology in their college at Bourges, displaying remarkable capacity for oral instruction, as well as great energy of character. He first preached in provincial churches, and in 1669 was sent to Paris, where he became very popular. Louis XIV. on many occasions invited him to preach at Versailles. He reformed in a measure the somewhat theatrical pulpit oratory of his day, and restored it to greater simplicity, directness, and sincerity. For 20 years he continued a favorite preacher. Louis XIV. sent him to Languedoc to reconcile the Protestants to the repeal of the edict of Nantes. In the latter part of his life he chiefly devoted himself to charitable labors. His sermons, often published during his lifetime, and translated into many foreign languages, are remarkable for their

solid learning and eloquence. The most celebrated of them is the sermon on the Passion. The edition by Père Bretonneau, in 16 volumes, is generally considered the most complete and valuable. Prominent among more recent editions is that of Didot (3 vols. 8vo, 1840).

BOURDEILLES. See BRANTÔME.

BOURDIN, Maurice, an antipope, born in Limousin, France, died at Fumone, Papal States, in 1122. He was arch priest of the diocese of Toledo in 1095, afterward bishop of Coimbra, and in 1110 archbishop of Braga. Pope Paschal II. sent him as legate to Henry V. of Germany, but excommunicated him for having crowned the emperor without authority, and for other acts of insubordination. After the death of Paschal and the election of Gelasius II. (1118), the emperor set up Bourdin as an antipope under the name of Gregory VIII., and drove Gelasius from Rome. But the opposition of the clergy rendered his position untenable, and after the death of Gelasius (1119) Henry was reconciled with Calixtus II., the legitimate successor to the papal see. The fugitive antipope was brought back ignominiously to Rome and imprisoned for the rest of his life in the castle of Fumone.

BOURDON, Louis Pierre Marie, a French mathematician, born at Alençon, July 16, 1799, died in Paris, March 15, 1854. He was professor in the principal colleges of Paris, and finally inspector of studies and a member of the council of the university. His *Éléments d'arithmétique* and *Éléments d'algèbre* have passed through many editions; and the latter, adapted by Prof. Charles Davies (1884), has been extensively used in the United States. His *Trigonométrie rectiligne et sphérique* was published in 1854 as a text book according to the new system of instruction in France.

BOURDON, Sébastien, a French painter, born at Montpellier in 1616, died in Paris in 1671. He became acquainted with Claude Lorraine in Rome, where he was denounced as a Calvinist, and obliged to return to Paris. There he was one of the founders of the academy of painting and sculpture. Exiled to Stockholm during the troubles of the Fronde, he was employed by Queen Christina as her principal painter; but when she embraced Roman Catholicism he returned to France. Many of his works, remarkable for a brilliant and easy style, are in French galleries, especially in the Louvre, which possesses his masterpiece, the "Crucifixion of St. Peter." He also excelled as an engraver, his prints in aquafortis exceeding 100.

BOURG, or **Bourg-en-Bresse**, a town of France, capital of the department of Ain, on the Reysouze, 20 m. E. S. E. of Mâcon; pop. in 1866, 18,733. The streets are narrow, but there are fine public buildings. A lyceum was opened in 1856. Outside the walls is the church of Notre Dame de Bron, with celebrated monuments of its founder, Margaret of Austria, of her husband, Philibert of Savoy, and of her mother-in-law, Margaret of Bourbon; it has a sun dial

reconstructed by the astronomer Lalande, who was born here. Bourg was important under the Roman empire, and successively belonged to the kings of Burgundy and the emperors of Germany, coming into the possession of France in 1601.

BOURG, Anne du, a French Protestant martyr, born at Riom in 1521, executed in Paris, Dec. 20, 1559. He took orders, but quitted the church for the bar, became a professor of law, embraced Calvinism, and after remonstrating with Henry II. in behalf of the reformers, was imprisoned in the Bastille and degraded as a heretic by the archbishop of Paris. After the death of Henry II., the elector Palatine applied to Francis II. for his release, proposing to give him a professorship at Heidelberg; but Minard, one of his judges and the especial friend of the cardinal de Lorraine, being assassinated during the trial, the so-called *ordonnance minarde* was passed sentencing him to death. He was hanged in the place de la Grève, and his body burned.

BOURCADE, François, a French priest and orientalist, born at Ganjou, department of Gers, July 7, 1806, died in 1866. He was ordained in 1832, and in 1838 went as a missionary to Algeria, and thence to Tunis, where he founded a hospital, a college, and schools for girls, and was appointed to serve the chapel and other institutions for females established by Louis Philippe in honor of St. Louis (Louis IX.), on the spot where that monarch was believed to have died. He published *Soirées de Carthage*; *La clef du Coran*; *Le passage du Coran à l'Évangile*; *La toison d'or de la langue phénicienne*, containing many Punic inscriptions; part of a translation of the romance of Antares (1864); and a *Lettre à M. E. Renan* (1864), in reply to Renan's *Vie de Jésus*.

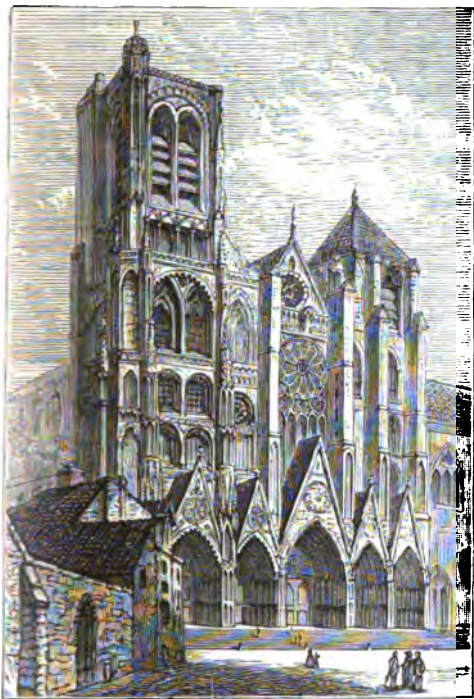
BOURGELAT, Claude, a French veterinary surgeon, born in Lyons in 1712, died in 1799. He began to practise as an advocate, and afterward served in the cavalry, where he became very skilful in the treatment of horses. In 1762 he opened a veterinary school at Lyons, the first in France. He was a member of the Paris and Berlin academies of science. The best of his many works, *Traité de la conformation extérieure du cheval, de sa beauté et de ses défauts* (Paris, 1776; 8d part by Huzard, 1808-'8), passed through many editions, and was translated into several languages.

BOURGEOIS, Anicet. See ANICET-BOURGEOIS.

BOURGEOIS, Dominique François, a French inventor, born in 1698, died in Paris in 1781. He first exhibited his mechanical talent while employed in a locksmith's shop in Paris. Having claimed the invention of the celebrated automaton duck of Vaucanson, he was indicted as an impostor and imprisoned over two years. In 1744 he invented a lantern which received the approval of the academy of sciences, and established a manufactory in which he was ruined by his partners. The academy having in 1766 granted him a prize for the best mode of light-

ing a town, the city of Paris gave him a monopoly for 20 years; but he was again defrauded by his associates, and died destitute. Catharine II., of Russia employed him in the construction of a lighthouse at St. Petersburg. Père Joly published under the name of Bourgeois two *Mémoires sur les lanternes à réverbère* (Paris, 1764).

BOURGES, a town of France, capital of the department of Cher, and formerly of the province of Berry, at the confluence of the Auron and Yèvre, 60 m. S. S. E. of Orleans; pop. in 1866, 80,119. Most of the old ramparts have been converted into promenades. The town has numerous interesting old houses and public



Cathedral of St. Étienne.

buildings. The cathedral of St. Étienne is one of the most celebrated in France, and in the church of St. Pierre is the tomb of Jeanne la Bienheureuse, consort of Louis XII. The hôtel de ville, originally the private mansion of Jacques Cœur, is an interesting building. The university of Bourges, founded in 1463, acquired great celebrity by the teachings of Alciati, Cujas, Calvin, and Theodore Beza. It has since been converted into a lyceum. Charles VII., from his temporary residence here, was called king of Bourges. Bourges is the see of an archbishop, and has excellent institutions of education and art. It is renowned for its school of artillery and extensive military workshops, and is one of the great arsenals of France. It has an iron foundry, saltpetre works, and cloth manufactories. The chief

trade is in sheep, wool, cloth, hats, cutlery, hosiery, porcelain, wine, and confectionery. The town is remarkable for its jewellers' and silversmiths' shops. It is the birthplace of Bourdaloue. It occupies the site of Avaricum, the ancient and flourishing capital of the Bituriges Oubi, which was captured by Cæsar in 52 B. C., when almost all its defenders and inhabitants were slaughtered. It was subsequently the metropolis of Aquitania, under the name of Bituriges. Destroyed by Chilperic I., it was restored by Charlemagne and enlarged by Philip Augustus. During the middle ages many councils were held here. The pragmatic sanction of Bourges, established under Charles VII. in 1438, declared the pope subordinate to a general council.

BOURIGNON, Antoinette, a Flemish fanatic, born in Lille, Jan. 13, 1616, died at Franeker, Oct. 30, 1680. She was so ugly that at her birth it was proposed to kill her as a monster; nevertheless, being of a rich family, she received several offers of marriage, which she refused in order to devote herself to a religious life. In 1636 she fled from home in male disguise, to avoid marrying, and entered a convent at Cambray, where she pretended to inspiration and made a number of converts among the nuns. Attempting to escape with some of her disciples, she was expelled, and after the death of her father took charge of a hospital at Lille, whence she was also expelled. She then travelled extensively, and at Amsterdam abjured Roman Catholicism, and urged reforms in religion and politics. Thence she fled to Holstein to avoid arrest, and took up her residence in the island of Nordstrand, where she gave umbrage to the authorities by the clandestine publication of her mystical writings. She afterward wandered over various parts of Europe, claiming to be the medium of a new revelation supplementary to that of the Scriptures, making proselytes, but often persecuted as a witch. Shortly before her death she was at the head of a hospital in East Friesland. Lacoste, Peter Poirer, and Noels, the secretary of Jansen, were among her disciples. Her writings were published by Poirer (25 vols., Amsterdam, 1676-'84; new ed., 1717).

BOURMONT, Louis Auguste Victor de Chalmes, count de, a French soldier, born at the château de Bourmont, Maine-et-Loire, Sept. 2, 1778, died there, Oct. 27, 1846. At the beginning of the revolution he emigrated with his father, who was on the staff of the prince de Condé, and after fighting for the Bourbons in La Vendée, he offered his services to Bonaparte. Implicated in the plot of the infernal machine, he was arrested, but escaped to Portugal, and Junot's influence reinstated him in the favor of Napoleon, who, after his distinguished military services in 1813-'14, especially at the defence of Nogent, made him general of division. Alternately serving Louis XVIII. and Napoleon, he deserted the emperor on the eve of the battle of Ligny, and proceeded directly to

the Prussian headquarters. Joining Louis XVIII. at Ghent, he restored the Bourbon authority in many important towns, and saved several provinces from foreign occupation, in consequence of which he was promoted to the command of a division of the royal guard. In 1823 he commanded under the duke of Angoulême in the Spanish campaign, and at its end was raised to the peerage. In 1829 he became minister of war, and in 1830 commander-in-chief of the expedition to Algeria, during which he was made marshal; but after the accession of Louis Philippe, to whom he refused allegiance, he was superseded by Gen. Clausel and dismissed the service. He coöperated with the duchess of Berry in her attempt to raise an insurrection in La Vendée, served Dom Miguel in Portugal, and went to Rome in the interest of Don Carlos. The amnesty of 1840 permitted his return to France, but he was mobbed at Marseilles, one of his sons being wounded, and his wife dying three months afterward from the effect of the excitement. His testimony against Marshal Ney was regarded as having sealed that soldier's doom.

BOURNE, Hugh, an English clergyman, the founder of the Primitive Methodists, born at Stoke-upon-Trent, April 3, 1772, died at Bemersley, Oct. 11, 1852. In 1807 some of the Wesleyan Methodists were desirous of reviving camp meetings, which the British conference declared "highly improper for England." Mr. Bourne and 20 of his friends, dissenting from this judgment, were expelled from the body, and the new sect, which was called into existence under his leadership, eventually included over 100,000 members, the first society having been founded by him in 1810. In 1844 Mr. Bourne visited the United States, where his preaching excited much attention.

BOURNE, Vincent, an English Latin poet, born about 1700, died Dec. 2, 1747. He was a graduate of Cambridge and usher at Westminster school, where Cowper was among his pupils. A collection of his Latin versions of old English ballads, with some original poems, was published under the title of *Poemata* in 1734, and was followed by several others. In 1808 appeared his posthumous "Poetical Works," with his letters (2 vols., London; new ed., Oxford, 1826). Cowper translated several of Bourne's original Latin poems.

BOURRIENNE, Louis Antoine Fauvelet de, private secretary of Napoleon I., born at Sens, July 9, 1769, died in Caen, Feb. 7, 1834. He was the schoolmate of Napoleon at the military institute of Brienne, and subsequently spent some time at Vienna, Leipsic, and Warsaw. After his return to Paris he renewed his intimacy with Napoleon, then a poor and friendless officer; but the decisive turn taken by the revolutionary movement after June 20, 1792, drove him back to Germany. In 1795 he again returned to Paris, and there again met Napoleon, who however at that time treated him coldly; but toward the end of 1796 he was

installed as his private secretary. After the 18th Brumaire Bourrienne received the title of councillor of state, was lodged at the Tuileries, and admitted to the first consul's family circle. In 1802 the army contractor Coulon, whose partner Bourrienne had secretly become, and for whom he had procured the lucrative business of supplying the whole cavalry equipment, failed with a deficit of 3,000,000 francs; the chief of the house disappeared, and Bourrienne was banished to Hamburg. He was afterward appointed to watch in that city over the strict execution of Napoleon's continental system. Accusations of peculation arising against him from the Hamburg senate, from which he had obtained 2,000,000 francs, and from the emperor Alexander, whose relative the duke of Mecklenburg he had also mulcted, Napoleon sent a commission to inquire into his conduct, and ordered him to refund 1,000,000 francs to the imperial treasury. Thus, a disgraced and ruined man, he lived at Paris until Napoleon's downfall in 1814, when this amount was restored to him by the French provisional government, and he was appointed postmaster general, but removed by Louis XVIII., who, however, at the first rumor of Napoleon's return from Elba, made him prefect of the Paris police, a post he held for eight days. As Napoleon, in his decree dated Lyons, March 13, had exempted him from the general amnesty, he followed Louis XVIII. to Ghent, was thence despatched to Hamburg, and created on his return to Paris state councillor, and subsequently minister of state. His pecuniary embarrassments forced him in 1828 to seek a refuge in Belgium, on an estate of the duchess of Brancas at Fontaine l'Évêque, not far from Charleroy. Here, with the assistance of M. de Villermest and others, he prepared *Mémoires sur Napoléon, le directoire, le consulat, l'empire et la restauration* (10 vols. 8vo, 1829-'31; English translation, 4 vols., Edinburgh, 1831). This work, which throws much light upon Napoleon's career, led to a counter-publication entitled *Bourrienne et ses erreurs volontaires et involontaires* (2 vols., Paris, 1830). The loss of his fortune, said to have been caused by the revolution of 1830, drove him mad, and the last two years of his life were spent in an asylum, where he died from apoplexy.

BOURRIT, Marc Théodore, a Swiss artist and author, born in Geneva about 1739, died near that city about 1815. He early evinced artistic talent, and reproduced the beauties of Alpine scenery in remarkable descriptions and illustrations, while gaining a livelihood as a chorister. Victor Amadeus of Sardinia and Louis XVI. became his patrons, and the latter gave him a pension. At the instance of Buffon, who had presented him to the French monarch, he took up his residence in Paris. After repeated unsuccessful attempts to ascend Mont Blanc with De Saussure, he succeeded in reaching the summit in 1787. He was remarkable for generosity and courage, once at great risk saving Prince

Galitzin, then unknown to him, from drowning. His principal works are: *Description des Alpes pennines et rhétiennes* (2 vols., Geneva, 1781); new edition, comprising also *Nouvelle description des glaciers et glaciers de la Savoie, particulièrement de la vallée de Chamouny et du Mont Blanc* (3 vols., 1787); and *Description des cols et passages des Alpes* (2 vols., 1803).

BOURSAULT, Edme, a French author, born at Mussy-l'Évêque, Burgundy, in October, 1838, died at Montluçon, Sept. 15, 1701. He went to Paris in 1651, became after a few years a popular writer, and was appointed teacher of the dauphin in reward for his publication *De la véritable étude des souverains* (Paris, 1671); but he declined this office, as well as membership of the academy, on account of his ignorance of Latin. By his attacks upon high personages at court he lost a pension of 2,000 francs that had been given him by Louis XIV., and narrowly escaped the Bastille. He assailed Molière, who revenged himself by impaling him in his comedy *L'impromptu de Versailles*; attacked Boileau in *La satire des satires*, but subsequently was of service to him; and disparaged Racine's *Britannicus* in a preface to his novel of *Artemise et Polianthe*. His *Lettres de respect, d'obligation et d'amour* (*Lettres à Babet*) derive a romantic interest from the story of Babet, who died in a convent to which she had been consigned by her parents on account of her devotion to Boursault. His fame rests chiefly on his comedies, *Ésope à la ville*, *Ésope à la cour*, and *Le Mercure galant*, the last of which is still occasionally performed.

BOUSSINGAULT, Jean Baptiste Joseph Diédonné, a French chemist, born in Paris, Feb. 2, 1802. He was educated in the mining academy at Saint-Étienne, and afterward employed by an English company to direct the working of some mines in South America. During the revolution and the war of independence he joined Bolivar, and obtained the rank of colonel. He explored Venezuela, and all the regions between Cartagena and the mouths of the Orinoco, as well as Peru and Ecuador, making numerous observations in meteorology and collections in botany and mineralogy. He was the friend and correspondent of Alexander von Humboldt. On his return to France, he was appointed professor of chemistry and dean of the faculty of sciences at Lyons; and in 1839 he became a member of the institute and taught in the chair of Dumas at the Sorbonne. Among his best works is *Économie rurale* (2 vols., Paris, 1844; English translation by Law, London, 1845; new French ed., *Agronomie, chimie agricole et physiologie*, 3 vols., 1861-'4). The appreciation of manures according to the proportions of nitrogen which they contain is chiefly due to the researches of Boussingault; and in coöperation with Dumas he measured the exact proportions of the constituent elements of atmospheric air. He has made valuable observations on the peculiar properties and uses of

different kinds of vegetables in the feeding and the fattening of cattle, and discovered a very simple method of preparing oxygen by means of baryta. He is one of the chief writers for the *Annales de physique et de chimie*, and for the annals of the academy. He was elected to the constituent assembly in 1848.

BOUTERWEK, Friedrich, a German metaphysician and writer on æsthetics, born at Oker, near Goslar, April 15, 1766, died at Göttingen, Aug. 9, 1828. He began the study of law at the university of Göttingen, but soon neglected it to devote himself to literary pursuits, and wrote a number of poems and a romance, *Graf Donamar* (republished at Göttingen in 1800). In 1787 he went to Hanover and afterward to Berlin; but, discouraged at the cold reception of his works, he returned in 1789, and applied himself to philosophy and literary history. He became a supporter of Kant, and delivered a course of lectures on his doctrines. In 1797 he was appointed adjunct professor of philosophy at Göttingen, and in 1802 full professor. From a disciple of Kant he became an ardent follower of Jacobi, his *Lehrbuch der philosophischen Wissenschaften* (2 vols., Göttingen, 1813; 2d ed., 1820) and his *Religion der Vernunft* (Göttingen, 1824) supporting opinions exactly opposed to those of his *Ideen zu einer allgemeinen Apodiktik* (1799). His principal and most famous work was his *Geschichte der neuern Poesie und Beredsamkeit* (12 vols., Göttingen, 1801-'19). The section of this work relating to Spanish literature has acquired an especially wide reputation; it has been translated into Spanish, and into English (2 vols., London, 1828). He also published *Æsthetik* (1806; with large additions, Leipsic, 1824) and *Kleine Schriften* (1818).

BOUTEVILLE, François de Montmorency, seigneur de, sovereign count of Suxe, a French duellist, born in 1600, beheaded in Paris, June 27, 1627. In his youth he served against the Huguenots, and acquired notoriety as the most intrepid and skilful duellist of his day. For one of his duels, fought on Easter day, 1624, he, his adversary, and their seconds were condemned by the parliament of Paris to be hanged; but they escaped, and the scaffold was destroyed by their friends. In 1626 he killed a marquis de Thorigny, then wounded one of his intimate friends who reproached him because he had not chosen him as his second. For these two affairs he was obliged to fly to Brussels. The governing archduchess received him kindly, and interceded for his pardon with Louis XIII. The king refusing, Bouteville exclaimed, "As the king refuses to pardon me, I shall fight next in Paris." This he did, fighting a duel with the marquis de Beuvron, a relation and avenger of Thorigny. For this both were executed, in spite of the intercession of many powerful friends. Bouteville left a widow, who six months after his death gave birth to a son, who became celebrated as the marshal de Luxembourg.

BOUTWELL, George Sewall, an American statesman, born in Brookline, Mass., Jan. 28, 1818. He is the son of a farmer, and received a common school education, which he supplemented by a course of reading and self-instruction, continued far into manhood. In 1835 he became a merchant's clerk in Groton, Mass., and subsequently was made a partner in the business. At 18 years of age he began the study of law, which he pursued chiefly by night, and of which he acquired a considerable knowledge, although he never became a practitioner. In 1840 he entered political life as an advocate of the election of Van Buren to the presidency, and between 1842 and 1851 he was seven times elected as a democratic member from Groton of the Massachusetts house of representatives, where he developed ability as a debater, and was recognized as a leader of his party. In 1844, 1846, and 1848 he was the democratic candidate of his district for member of congress, but failed in each instance of an election; and in 1849 and 1850 he was nominated by the same party for governor of the commonwealth. In 1849-'50 he was state bank commissioner. In 1851, by a coalition of democrats and freesoilers, he was elected governor, and in the succeeding year was again returned for the same office. After the repeal of the Missouri compromise in 1854 he left the democratic party, and the next year helped organize the republican party, with which he has since acted. He was a delegate in 1860 to the republican convention at Chicago, which nominated Lincoln for the presidency, and a member of the peace conference which assembled in Washington in February, 1861. In 1862, at the invitation of President Lincoln, he organized the new department of internal revenue, and was its first commissioner till March 4, 1863, when he became a member of congress, and was twice reelected to that office. In 1868 he was one of the managers in the impeachment trial of President Johnson. He was secretary of the treasury from March, 1869, to March, 1873, when he was elected United States senator from Massachusetts. He has opposed any considerable diminution of national taxation, and advocated a large annual reduction of the public debt. In 1870 congress at his recommendation passed an act providing for the funding of the national debt, by the terms of which the secretary of the treasury was authorized to sell certain bonds under certain plainly expressed conditions, but not to increase the debt. He attempted to effect this object through the instrumentality of a "syndicate," but in funding the new loan expended more than one half of one per cent., which was alleged to be in defiance of the law. The committee of ways and means of the house of representatives subsequently absolved Mr. Boutwell from this charge. He has been an overseer of Harvard college, was for five years secretary of the Massachusetts state board of education, in which capacity he prepared elaborate

annual reports, and was a leading member of the Massachusetts constitutional convention of 1853. He is the author of "Educational Topics and Institutions," a "Manual of the United States Direct and Revenue Tax" (1863), and a volume of "Speeches and Papers" (1869).

BOUVART, Alexis, a Swiss astronomer, born near Mont Blanc, June 27, 1767, died June 7, 1843. He went to Paris in 1785, attended the free lectures at the collège de France, was attached to the observatory, in 1804 became a member of the bureau of longitudes, and was elected to the academy of sciences through the influence of Laplace, whom he assisted in the *Mécanique céleste*. In 1808 he published new tables of Jupiter and Saturn, to which in 1821 he added those of Uranus, whose perturbations he was the first to point out and explain. Le-verrier's discovery of Neptune in 1846 confirmed Bouvart's hypothesis.

BOUVET, Joachim, a French Jesuit missionary, born at Le Mans about 1662, died in Peking, June 28, 1732. Sent by Louis XIV. to China, he was employed by the Chinese emperor in directing various public buildings, and allowed to build a church within the imperial city. On his return to France in 1697, he presented to Louis XIV. 49 Chinese works, and in 1699 departed again for China with 10 other missionaries. He labored for nearly 50 years to promote the progress of the sciences in that empire, gave an account of the state of China in several treatises and letters, and composed a Chinese dictionary, which has never been printed.

BOUVIER, John, an American jurist, born at Codognan, France, in 1787, died in Philadelphia, Nov. 18, 1851. He was of a Quaker family, which emigrated to this country and settled in Philadelphia when he was in his 15th year. He obtained employment for several years in a bookstore, published a newspaper for a short time at Brownsville, was admitted to the bar in 1818, and in 1822 began to practise in Philadelphia. In 1838 he became associate judge of the court of criminal sessions. He published in 1839 a "Law Dictionary, adapted to the Constitution and Laws of the United States of America, and of the several States of the American Union," the fruit of 10 years' labor (2 vols. 8vo). In 1841 he commenced a new edition of Bacon's "Abridgment of the Law," in 10 vols. royal 8vo. His greatest work, published two months before his death, was the "Institutes of American Law" (4 vols. 8vo).—His daughter and only child, HANNAH M. BOUVIER, born in 1811, is the author of a popular work entitled "Familiar Astronomy," illustrated by celestial maps and engravings, with a "Treatise on the Globes," &c. (8vo, Philadelphia, 1857).

BOVES, José Tomas, a Spanish American military adventurer, born in Spain, killed at Urica, Venezuela, Dec. 5, 1814. While employed as a naval officer on the northern coast of South America he was tried and imprisoned for brib-

ery and prevarication. After his release he acted with the revolutionists in the outbreak of the war of independence in Venezuela, but subsequently joined the royalists and served as captain under Cagigal, after whose defeat he took up an independent position at Calabozo, and with 500 men, many of whom were slaves, defeated Marino, dictator of the eastern provinces. His band being increased by vagabonds and fugitives from justice, he worsted the independents twice, slaughtered all his prisoners, and gained for his force the name of the infernal division. He was defeated by Rivas, when many of his men were captured and put to death; but in 1814 he beat Bolívar and Marino at La Puerta, and captured Valencia after a blockade, and, in violation of a solemn pledge, ordered the republican officers and many of the soldiers to be shot. Boves, coöperating with Morales, was again victorious at Angaita, obliged Bolívar to retreat to Cartagena, and entered Carácas. He fell in the battle of Urica, and was buried while his victorious troops were massacring their captives.

BOVINES, or *Bouvines*, a village of French Flanders, on the Marq, 7 m. S. E. of Lille, celebrated for the victory gained by Philip Augustus of France over Otho IV. of Germany, July 27, 1214. In 1340 Philip of Valois defeated here 10,000 English troops; and on May 17 and 18, 1794, the French here defeated the Austrians.

BOVINO (anc. *Bovinum* or *Vibinum*), a fortified town of Italy, in the province of Capitanata, 18 m. S. S. W. of Foggia; pop. about 6,000. It is memorable for a defeat of the imperialists by the Spaniards in 1734.

BOW. See **ARBOREY**.

BOWDICH, Thomas Edward, an English traveler, born in Bristol in 1790, died in Africa, Jan. 10, 1824. He went to Cape Coast Castle, where his uncle was governor, in 1816, as writer in the service of the English African company; and in 1817 he was second in command of a mission to Ashantee. Becoming chief of this mission, he concluded an advantageous treaty with the Ashantee ruler. He afterward went to Paris and studied under Cuvier and other eminent men, with a view of preparing himself for a second African expedition; but he succumbed to the climate soon after reaching the mouth of the Gambia. He published works on African travel and geography, the most important of which is "Mission from Cape Coast Castle to Ashantee" (London, 1819).

BOWDITCH, Nathaniel, an American mathematician, born in Salem, Mass., March 26, 1778, died in Boston, March 16, 1838. The son of a cooper, he was sent to school till 10 years of age, and was then taken into his father's shop. He was soon transferred to a ship chandlery, and remained in this business till he made his first voyage in 1795. His education and all his labors in mathematics were accomplished by improving his leisure while pursuing other avocations. An English sailor taught him the ele-

ments of navigation. He began the study of Latin alone, that he might read the *Principia* of Newton; and later in life he taught himself Spanish, Italian, and German. Between 1795 and 1803 he made five long voyages, successively as clerk, supercargo, and master, to the East Indies, Portugal, and the Mediterranean. On his return from his last voyage he arrived off Salem by night in a violent snow storm, and with no other guide than his reckoning, confirmed by a single glimpse of the light on Baker's island, found his way safely into the harbor. In 1802 he published his "New American Practical Navigator," which passed through many editions, and was esteemed the best work of the sort ever published (English ed. by Kirby, London, 1802). On the close of his seafaring life, he was elected president of the Essex fire and marine insurance company, which situation he held till 1823. His attachment to his native place made him decline the chair of mathematics in Harvard university in 1808, in the university of Virginia in 1818, and at West Point in 1820. Among his productions were a chart of remarkable beauty and exactness of the harbors of Salem, Marblehead, Beverly, and Manchester; many contributions, chiefly on astronomical subjects, to the "Transactions" of the American academy of arts and sciences; the article on modern astronomy in vol. xx. of the "North American Review;" and many articles in the American edition of "Rees's Cyclopædia." He completed between 1814 and 1817 the great undertaking on which his fame chiefly rests, a translation of the *Mécanique céleste* of Laplace (4 vols., 1829-'38); the 5th volume, which Laplace had added to his work many years after the other, was subsequently issued under the editorial care of Prof. B. Peirce, accompanied by an elaborate commentary. It was estimated that there were at that time but two or perhaps three persons in America, and not more than 12 in Great Britain, who were able to read the original work critically. The French astronomer, thoroughly master of the mighty subject, very often omitted intermediate steps in his demonstrations, and grasped the conclusion without showing the process. It was the design of Dr. Bowditch to supply these deficiencies. Another object was to record subsequent discoveries, to continue the original work to the latest date, and to subjoin parallel passages from geometers who had treated of the same subjects. A third object was to show the sources from which Laplace had derived assistance. The elucidations and commentaries form more than half the work as produced by Dr. Bowditch. In 1823 he became actuary of the Massachusetts hospital life insurance company in Boston. During the latter years of his life he was a trustee of the Boston Athenæum, president of the American academy of arts and sciences, and a member of the corporation of Harvard college.—See "Mémorial of Nathaniel Bowditch," by his son, N. I. Bowditch (Boston, 1839).

BOWDOIN. I. *James*, governor of Massachusetts, born in Boston, Aug. 8, 1727, died Nov. 6, 1790. He was a descendant of Pierre Baudouin, a French Huguenot who fled to America on the revocation of the edict of Nantes. He graduated at Harvard college in 1745, became in 1753 representative in the general court, and was subsequently senator and councillor. During the troubles which preceded the revolution, he was forward in opposition to the royal governor. In 1775 he was president of the council of government; when the convention assembled in 1778, for the formation of a constitution, he was chosen president; and in 1785 he succeeded Hancock as governor. It was during his administration that the disturbances in the western counties of Massachusetts, known as Shays's rebellion, occurred. He called out 4,000 militia, and the speedy suppression of the insurrection was due to his vigorous course; yet he lost his election the next year. He was afterward a member of the convention for the adoption of the federal constitution. He was a friend and correspondent of Franklin, and one of the founders and first president of the academy of arts and sciences, to which he bequeathed his library. He left a legacy to Harvard college, and aided in the establishment of the Massachusetts humane society. II. *James*, son of the preceding, born Sept. 22, 1752, died on Naushton island, Mass., Oct. 11, 1811. He graduated at Harvard college in 1771, afterward spent one year at Oxford, and commenced his travels on the continent, but returned to the United States after the battle of Lexington. He was minister to Spain from 1805 to 1808, and acquired in Paris an extensive library, philosophical apparatus, and collection of paintings, all of which he left at his death to Bowdoin college, together with 6,000 acres of land, and the reversion of the island of Naushton, one of the Elizabeth islands in Buzzard's bay, which had been his favorite residence.

BOWDOIN COLLEGE, the oldest and most prominent literary institution in the state of Maine, situated at Brunswick, on an elevated plain S. of the village, about 1 m. from the Androscoggin river, and 4 m. from the shore of the Atlantic ocean. It was named in honor of Gov. James Bowdoin of Massachusetts. Prior to the revolution it had been proposed to establish a college in Maine, then a district of Massachusetts; but it was not till 1788 that a petition for a charter was presented to the Massachusetts legislature, from the association of ministers and the court of sessions for Cumberland county. The charter was granted in 1794, together with five townships as a foundation for the college, whose object, as stated in the act of incorporation, should be to "promote virtue and piety, and the knowledge of the languages and of the useful and liberal arts and sciences." The government was vested in two boards, one of trustees and the other of overseers, which met in 1801, and elected Joseph McKeen, D. D., a graduate of Dartmouth, for president

of the college, and John Abbott, a graduate of Harvard, for professor of languages. These officers were installed in 1802, when eight students were admitted, and in 1806 the first honors bestowed by the new institution were conferred upon eight graduates. A single building at this time served all the college uses, and also as the residence of the family of the president. President McKeen, dying in 1807, was succeeded by Jesse Appleton, D. D., who during the 12 years of his presidency contributed largely to the prosperity of the college. James Bowdoin, son of the governor, had before made a donation to the college of 1,000 acres of land and more than £1,100; and at his death in 1811 he left to it another donation of land. 400 models in crystallography, more than 500 specimens of minerals which had been arranged by Haly, an elegant private library, and a costly collection of paintings. This gallery, since then much increased, is one of rare excellence, and the crystals and minerals were the nucleus of the large and valuable mineralogical and conchological cabinets which have been collected and arranged by Prof. Cleaveland. Upon the death of President Appleton in 1819, the Rev. William Allen, who had formerly been president of Dartmouth university, was elected his successor, and retained the office till 1839, with the exception of a short interval in 1831, when, being indirectly removed by an act of the legislature of Maine, which had now become a separate state, he contended against the authority of the state thus to control the college, and the question was decided in his favor by adjudication in the circuit court of the United States. President Allen was succeeded by Leonard Woods, D. D., who held the position till 1866. In 1867 the Rev. Samuel Harris, S. T. D., became president, and was succeeded in 1871 by Joshua L. Chamberlain, LL. D.—There are now eight college buildings, all large brick structures, excepting the chapel, which is of light granite, in the Romanesque style, and "Memorial Hall," of the same material. It was begun in 1846 and completed in 1855, and has rooms also for the library and picture gallery. The government of the college is vested in a board of 18 trustees and 40 overseers. Among the trustees are the president and vice president of the college. There is a visiting committee and an examining committee, each composed of two trustees and three overseers, and a finance committee of two trustees and two overseers. Besides the president, there are, including those in the medical school, 17 professors, 8 instructors, and 6 lecturers. During the year 1871-'2 the college had 163 undergraduates, 4 post-graduates, and 67 medical students; total, 234. The college year, divided into three terms, begins about the middle of September and ends on the second Wednesday of July, when the commencement exercises are held; there is a vacation of six weeks, beginning the last week in November, between the first and second terms, and one of a week in

April, between the second and third terms. The regular course of study comprises four years—all studies being required, except that for the third term of the junior year Italian and Greek are optional, and for the second term of the senior year Spanish is optional. Examinations are held at the end of each term. Besides the regular classical course, there is a scientific course for undergraduates. The degree of Sc. B. is conferred in this department. There is also a post-graduate course of two years in philosophy and the arts, in which are conferred the degrees of A. M., Sc. D., and Ph. D. Graduates who have completed any post-graduate course with honor may be appointed fellows, to reside at college, with all the privileges of the same, one or two years longer without charge. Instruction is given in military science, and daily exercises in drill are held, by an officer of the army detailed to perform these duties. The annual college expenses for each student are \$60 for tuition and \$10 for room rent. Ten scholarships, each yielding from \$50 to \$60 per annum, have been founded by individual benefactors, and there are several college scholarships. Assistance is furthermore afforded to students from a fund of \$6,000 given by Mrs. Amos Lawrence of Massachusetts, and one of \$2,000 given by Daniel W. Lord of Kennebunkport. The college has received no aid through legislative appropriation. The medical school of Maine was united with this college in 1821, and has now a complete anatomical cabinet and chemical apparatus, and a library of 4,000 volumes. The annual course of lectures, extending over a term of 16 weeks, begins early in January. The number of professors and instructors in the medical school in 1872 was 13; students, 67. The library of the college, together with those belonging to the societies of the students (exclusive of the medical library), contains 30,188 volumes. According to the triennial catalogue of 1870, the whole number of alumni was 1,677, of whom 1,150 survived; whole number of ministers, 316, living 227; whole number of doctors, 993, living 834. Parker Cleaveland, one of the earliest eminent mineralogists in America, was connected with the college from 1805 to 1858. Thomas O. Upham, D. D., held the position of professor of mental philosophy from 1824 to 1867. Nathaniel Hawthorne and Henry W. Longfellow graduated here in 1825, and among their contemporaries as students in the college were Luther V. Bell, G. B. Cheever, William P. Fessenden, John P. Hale, Franklin Pierce, S. S. Prentiss, and Calvin E. Stowe. Mr. Longfellow was the professor of modern languages from 1829 to 1835, when he was called to Harvard. The prevailing religious denomination at Bowdoin college is the Congregationalist.

BOWEN, Francis, an American author, born at Charlestown, Mass., Sept. 8, 1811. He graduated at Harvard college in 1833, and during four years was instructor there in intellectual philosophy and political economy. In 1848 he

succeeded Dr. Palfrey as editor and proprietor of the "North American Review," which he conducted till 1854. He was rejected in 1850 by the board of overseers of Harvard college as professor of history on account of his unpopular views on politics and on the Hungarian struggle for independence, but was almost unanimously confirmed in 1853 as Dr. Walker's successor in the Alford professorship of natural religion, moral philosophy, and civil polity. In 1848-'9 he delivered lectures before the Lowell institute on the application of metaphysical and ethical science to the evidences of religion (published in 1849; revised and enlarged edition, 1855); in 1850, on political economy; in 1852, on the origin and development of the English and American constitutions; and subsequently on English philosophers from Bacon to Sir William Hamilton. He supports Locke and Berkeley, and opposes Kant, Fichte, Cousin, Comte, and John Stuart Mill. Mr. Mill, in the third edition of his "Logic," makes elaborate comments on Mr. Bowen's antagonistic views. Among his works are: an annotated edition of Virgil; a volume of "Critical Essays on the History and Present Condition of Speculative Philosophy" (1842); an abridged edition of Dugald Stewart's "Philosophy of the Human Mind"; "Documents of the Constitution of England and America, from Magna Charta to the Federal Constitution of 1789" (1854); contributions to Sparks's "Library of American Biography"; "Principles of Political Economy applied to the Condition, Resources, and Institutions of the American People" (1856), in which he opposes the theories of Adam Smith, Malthus, and Ricardo, as inapplicable to the United States; and a revised edition of Reeve's translation of De Tocqueville's "Democracy in America" (2 vols. 8vo, 1862). In 1872 he made an extended tour in Europe.

BOWER BIRD, the name of two genera of conirostral birds of the starling family, peculiar to Australia. In the genus *ptilonorhynchus* (Kuhl) the bill is moderate, compressed, arched, and notched at the tip; the nostrils lateral, deeply sunk, with large opening partly concealed by projecting plumes; wings long and pointed, the first three quills graduated, and the fourth and fifth equal and longest; tail short and even; tarsi much longer than middle toe, robust and scaled; all four toes long and strong, with sharp claws. Two species are described by Gray, found chiefly in forests bordering the larger rivers of Australia, and in thick brushes of cedar; when perched on lofty trees they utter loud and harsh notes, somewhat resembling those of a domestic cat; they congregate in autumn in small flocks on the ground. The satin bower bird (*P. holosericeus*, Kuhl) is about the size of a jackdaw or small crow; in the adult male the plumage is deep satiny blue black, the primaries velvety black, and the wings and tail of the last color, edged with blue black; eyes light blue, with red circle around the pupil; bill bluish horn-colored,

yellowish at tip, and legs and feet yellowish white. The female is grayish green above, the wings and tail sulphur brown; yellowish below, each feather scaled with a dark brown border. The old males are more rarely seen than the females and young males, and the last do not get their glossy plumage till the second or third year. They feed on berries and fruits, especially wild figs and the native cherry, and they often attack the ripening crops of the settlers. The common name is derived from the singular habit which the females have of making very extraordinary bower-like structures, of various sizes, which are the most curious examples of bird architecture on record, displaying more ingenuity combined with taste than any other members of the class of birds. On the ground, generally under the shelter of trees in a retired place, they form a dome-shaped bower of sticks and twigs on a platform of the same materials; these are so interwoven that the tops of the twigs turn in and nearly meet at the top, the forks always pointing outward so as to offer no



Satin Bower Bird (*Ptilonorhynchus holosericeus*).

obstruction to the ingress and egress of the birds. But the most singular habit is the manner in which the bower is ornamented; they collect with great perseverance all kinds of brilliant and striking objects, such as the gaudy feathers of parrots, shells, skulls, and bleached bones of small animals, bright stones, and such high-colored rags as they can find about the houses of the natives and settlers; these they place at or near the entrances, introducing feathers between the interstices in the most fantastic and often in a very pleasing manner; so prone are these birds to pick up any odd-looking thing, that the natives always search their bowers, sure of finding many articles which they have missed from their scanty possessions. These bowers, according to Mr. Gould ("Birds of Australia," London, 1848), are not used as nests, but probably as assembly rooms, where many individuals of both sexes sport in, the most playful manner; they are probably also used as places of rendezvous during pairing time, and for the elegancies and amusements

rather than the necessities of bird life. This species is the *courty* of the natives, and is found chiefly, if not only, in New South Wales; the male has a loud liquid call, besides the harsh note common to both sexes. The green satin bird (*P. Smithii*, Vig. and Horsf.) is rather smaller; the general color is a parrot green, with the ends of the wing coverts, secondaries, and most of the tail feathers tipped with white, and below with oval spots of the same. The food and the habitat are the same as in the last species, but it has not been ascertained that it makes a bower; it is called cat bird by the colonists, from the resemblance of its notes to the nightly concerts of the domestic cat.—The genus *chlamydera* (Gould) differs in having the nostrils exposed, a long and slightly rounded tail, and the third and fourth quills equal and longest. They are very shy birds, frequenting the forests and brushes of Australia; the food consists of fruits and seeds. They make still more remarkable bowers than the preceding genus, and the structures are longer and more avenue-like, made externally of interwoven twigs, and lined with tall grasses meeting above; they are decorated with bivalve shells, stones, small skulls, and whitened bones, the stones being arranged as a pavement, and so as to keep the grasses in place. The spotted bower bird (*C. maculata*, Gould) is about 11 inches long, the general color above being deep brown, each feather tipped with buff and edged with black on the head; the back of the neck is crossed by a broad frill of rosy pink elongated feathers; the lower parts grayish white; both sexes have the frill, except when young. In some of the larger bowers made by this bird, which had evidently been used for years, Mr. Gould has seen nearly half a bushel of shells and pebbles at each entrance, which had been brought from the shore at a considerable distance. The great bower bird (*C. nuchalis*, Gould) is about 15 inches long, and occurs in N. W. Australia; it is grayish brown above, satiny on the head, tipped with grayish white; on the nape a rosy pink frill partly encircled with a ruff of satiny plumes; yellowish gray below, tinged with brown; it makes highly ornamented bowers.

BOWIE, a N. E. county of Texas, separated on the north from the Indian territory and Arkansas by the Red river, bounded E. by Arkansas and S. and S. W. by the Sulphur fork of Red river; area, 892 sq. m.; pop. in 1870, 4,687, of whom 2,249 were colored. The surface is undulating, and in many places covered with thick forests of post oak and other timber. The soil of the bottoms is rich red land, well suited to cotton; in other localities it is sandy. Lignite coal and iron ore are found. There are several mineral springs. The chief productions in 1870 were 104,805 bushels of Indian corn, 11,223 of sweet potatoes, 2,990 bales of cotton, and 4,757 lbs. of honey. There were 772 horses, 1,501 milch cows, 4,178 other cattle, 578 sheep, and 7,011 swine. Capital, Boston.

BOWLERS, or *Boulders*, loose rounded blocks of stone, named by the French *blocs erratiques*, found scattered over the surface in high northern and southern latitudes, extending to within 85° or thereabouts of the equator. In the northern hemisphere they are always of the varieties of rock which are found in solid ledges in a northerly direction; and in the southern hemisphere the ledges are again met with toward the pole. These loose rocks appear in each case to have been transported toward the equator, either by glaciers or by icebergs, and to have been subjected to rolling action, which has rounded off their corners and ground their surfaces. (See *DILUVIUM*.) The size of these transported blocks is often enormous. At Fall River, Mass., on the S. side of the bay at the mouth of Taunton river, a boulder of conglomerate rock was uncovered in the gravel resting on granite ledges which was estimated to weigh 5,400 tons. The ledges of this conglomerate are met with only on the other side of the bay. Along the coast of New England the bowlders constitute by their great numbers and size a marked feature in the landscape. They are sometimes found perched upon bare ledges of rock, and so nicely balanced that, though of great weight, they may be rocked by the hand. These are called rocking stones. "Plymouth Rock" is a boulder of sienitic granite, ledges of which are found in the towns near Boston. The highest mountains are often covered with these bowlders of the drift formation. Upon the bare granite summit of Mt. Katahdin—the highest mountain in Maine—at an elevation of 3,000 feet or more above the surrounding valleys, pieces of limestone containing fossil shells are found, though no ledges resembling them are known except many miles to the northwest, and at a much lower level. The northern and central parts of Europe are equally interesting for the distribution of bowlders. The pedestal of the statue of Peter the Great at St. Petersburg was hewn out of a granite boulder, weighing about 1,500 tons, that lay on a marshy plain near the city. Upon the limestone ledges of the Jura mountains are found bowlders of granite which must have come from the higher Alps, where ledges of similar character are found. Some of these bowlders are of very large dimensions, one in particular, known as the *pierre à Martin*, according to Mr. Greenough, measuring no less than 10,296 cubic feet, and weighing consequently about 820 tons.

BOWLES, Caroline. See *SOUTHEY*.

BOWLES, Samuel, an American journalist, born in Springfield, Mass., Feb. 9, 1826. His father was proprietor of the "Weekly Republican" newspaper at Springfield, and the son became at an early age an apprentice in the office. In 1844 he induced his father to establish a daily newspaper, of which he became, though only 18 years of age, virtual editor. He has held this post ever since, and under his charge the "Springfield Republican" has

risen to prominence. Mr. Bowles has made several journeys in the region lying between the Mississippi and the Pacific, the first in 1865 with a large company, among whom was Mr. Schuyler Colfax. The observations made on this journey, originally written in the form of letters to his journal, appeared in a collective form under the title "Across the Continent" (1865). In 1869 he published two works, "Our New West" and "The Switzerland of America," the latter describing the natural parks and the mountains of Colorado.

BOWLES, William Augustus, an American adventurer, born in Frederick co., Md., in 1763, died in Havana, Dec. 23, 1805. His father was an English schoolmaster who had established himself in Maryland. When 18 years of age young Bowles ran away from home and joined the British army at Philadelphia. He obtained a commission, and was for some time stationed at Pensacola; but for a breach of regulations he was dismissed the service. Soon afterward he became connected with the Creek Indians, and married a woman of the tribe, in which he became an acknowledged leader. He encouraged their excesses and prompted them to many attacks on the Spaniards, in which he was sustained by the approval and even rewards of the British government. He commanded the Creeks when they assisted the British at Pensacola in May, 1781, and for his conduct on that occasion was restored to his place in the army. After the war he led a roving life—at one time an actor and again a portrait painter—until he was appointed by Gov. Dunmore leading agent for his old Indian allies, when he established himself at Chhattahoochie. McGillivray, who had led the Creeks during the revolution, drove him from his agency, and he went to England for a time; but on his return he was again made commander-in-chief of the tribe, and used his influence with such effect against the Spaniards that they offered \$6,000 for his capture. After disturbing the peace of Georgia for several years, he was taken in 1792 by the Spaniards, and sent to Madrid and afterward to Manila. He escaped, and for a time returned to his old allies; but he was finally recaptured in 1804, carried to Havana, and confined in the Morro castle till his death.

BOWLES, William Lisle, an English poet and clergyman, born at King's Sutton, Sept. 24, 1762, died in Salisbury, April 7, 1850. After attending Westminster school he entered Trinity college, Oxford, where he graduated in 1787. Disappointed in the expectation of a living, and much depressed by the death of a lady to whom he was engaged to be married, he made, soon after leaving the university, an extended journey in Great Britain, during which he composed the "Fourteen Sonnets" forming his first published work, which were much admired. They were followed by several less important writings, and in 1804 by his "Spirit of Discovery," a poem

in six books. In 1807 he published an edition of Pope's works in 10 volumes. From this time new works appeared in rapid succession, and comprised a great number of poems, of which the "Missionary of the Andes," published in 1815, acquired the greatest fame. He continued a prolific writer of verse and prose till 1837, when he seems to have retired from literary life. In the mean time he had received important preferment in the church, having been made rector of several parishes, in 1818 chaplain to the prince regent, and in 1828 canon of Salisbury cathedral. He was a man of eccentric habits, very absent-minded, and singularly timid. Bowles's edition of Pope, containing an essay with some severe comments on the poet, gave rise to a discussion which has become historical as "the Pope and Bowles controversy." In it Byron was his principal opponent, but Campbell, Gilchrist, and others were warmly engaged in it. Bowles defended his opinions with great ability.

BOWLING, or **Bowls**, an ancient athletic game, played with balls of different shapes rolled on a flat expanse of turf in the open air. The name is also sometimes applied to a modern American game more commonly called tenpins, which but slightly resembles the ancient sport, from which it is nevertheless undoubtedly derived. I. The ancient game of bowls, still a favorite pastime in Great Britain, requires, in order that it may be played with skill, the most careful preparation of the ground, called a bowling green, on which the turf must be closely shaved, watered, and rolled. It must be surrounded by a shallow trench. The balls (called bowls) which are used by the players are of hard wood, generally *lignum vitae*, six or eight inches in diameter, but are not exactly spherical, having a bias to one side. A small white spherical ball, called the jack, is placed at one end of the green, and the players endeavor so to roll their bowls that they shall fall as near as possible to this conspicuous mark. The irregular shape of the bowl makes it very difficult for a novice to calculate its course, and renders necessary a peculiar motion in rolling it. The players are generally arranged in sides, every man of each side having two bowls. The side which places its bowls nearest the jack counts one point in the game for each bowl so placed. The number making game is settled by the players before beginning. With unimportant variations, this method of playing bowls has been in use in Great Britain for centuries. The game has been the subject of several legislative enactments, having been prohibited altogether during the reign of Henry VIII., by a law repealed in 1845. Bowls was formerly a favorite game with the Dutch. The early inhabitants of New York city (in their time New Amsterdam) made it a common recreation, and the ground they used for play, at the lower end of Broadway, near the Battery, is now a small ornamental park, which still bears the name of the Bowling Green.

II. The modern game of tenpins or bowling is practised in saloons, on alleys of carefully fitted carpenter's work, from 50 to 65 ft. in length, and about 4 in width. The alley has a gutter, as it is termed, on each side, and is very slightly convex in the centre, regularly bevelled to the sides. At the further extremity are set up 10 pins, usually of ash wood, about a foot in height and 2 or 2½ lbs. in weight, arranged in the form of a pyramid, with the apex toward the bowler. The apex consists of a single pin, the 2d rank of 2, the 3d of 3, and the 4th of 4, the last occupying the whole width of the alley, and the first standing on the crown of it. All the pins are equidistant from each other. At these the bowler rolls wooden balls, perfectly spherical and usually of *lignum vitae*, from 4, 5, or 6 lbs., down to half a pound in weight, with the object of knocking down as many of the pins as possible at each roll. The pins, when set up, are called a frame; and at each frame the bowler rolls three balls, when the number of pins down is counted to him, and the frame is set up again for the next bowler. A game ordinarily consists of 10 frames, or 30 balls. If the bowler takes all the pins with his first ball, he counts 10; this is called a "ten-strike;" the frame is again set up for his second ball, when, if he again takes all, he counts 10 more, and the frame is again set up for his third, when whatever number he scores with the three balls counts to him as if all had been made off one frame. If he takes all the 10 with his first two balls, he is entitled to a fresh frame for his third or last ball; this is called a spare. It is now everywhere customary to employ a somewhat complicated method of counting gains thus made. By this arrangement, when a player gets a ten-strike or spare, he does not immediately have the frame set up for him especially, and proceed to roll the remaining one or two of his three balls while the other players wait for him; but in order to save time and the labor of unnecessary resetting, he waits till his next regular turn comes, and then counts the first ball or first two balls of it doubly—i. e., both as additions to his former ten-strike or spare, and as new counts for himself.

BOWLING GREEN, a town and the capital of Warren co., Ky., on Barren river, 120 m. S. W. of Frankfort; pop. in 1870, 4,574, of whom 1,670 were colored. The river is navigable to this point by steamboats of 200 tons, and regular lines run to Louisville. The Louisville and Nashville railroad passes through the town. Its trade, chiefly in pork and tobacco, is considerable, and there are a number of mills, and some manufactories of iron, woollens, &c. There are several churches and schools, and a weekly newspaper. At the beginning of the civil war it was regarded as a point of great strategic importance, and was occupied by Gen. Buckner in September, 1861, with a force of 10,000 confederates, which was subsequently largely increased, for the purpose of defending the ap-

proach to Nashville. After the capture of Fort Henry by the federal troops (Feb. 6, 1862), the confederates found themselves outflanked, and were obliged to evacuate the town.

BOWMAN, Thomas, D. D., an American clergyman, born near Berwick, Columbia co., Penn., July 15, 1817. He was educated at Wilbraham academy, Mass., at Cazenovia seminary, N. Y., and at Dickinson college, Carlisle, Penn., where he graduated in 1837. After studying law at Carlisle for one year, he entered the ministry in the Baltimore conference of the Methodist Episcopal church in 1839. From 1840 to 1843 he taught in the grammar school of Dickinson college. In 1848 he was appointed to organize the Dickinson seminary at Williamsport, Penn. Over this institution he presided for ten years, and during this period became distinguished as a pulpit orator. In 1858 he was elected president of Indiana Asbury university at Greencastle. He was elected delegate to the British conference in 1864, and was chaplain of the United States senate in 1864 and 1865. He continued to preside over the Indiana Asbury university till May, 1872, when he became a bishop. His residence is St. Louis, Mo.

BOWRING, Sir John, an English statesman and author, born at Exeter, Oct. 17, 1792, died Nov. 22, 1872. He early applied himself to the study of modern languages, and between 1821 and 1824 published metrical translations of the popular poetry of Russia, Holland, and Spain, and afterward of Poland, Servia, Hungary, Portugal, Iceland, and Bohemia. About 1822 he made the acquaintance of Jeremy Bentham, became his disciple, executor, and biographer, and edited his works (11 vols. 8vo, 1843). In 1825 he was made first editor of the "Westminster Review," and continued in this position for several years, writing copiously in support of parliamentary reform and free trade. He travelled in Holland in 1828, and received the honorary degree of LL. D. from the university of Groningen. In 1833 he published "Matins and Vespers, with Hymns," a volume of original poetry, chiefly devotional. He wrote with Villiers "On the Commercial Relations between France and Great Britain" (2 vols., 1834-'5), the result of official investigation, and was employed in similar labors relating to Switzerland, Italy, the Levant, and the German customs union. As a member of parliament from 1835 to 1837, and again from 1841 to 1849 he invariably advocated extreme liberal opinions, and was one of the counsel of the anti-corn law league. In January, 1849, he was appointed British consul at Canton, and subsequently he became acting plenipotentiary. He returned to England for a short time in 1853, and published two volumes in support of a decimal system of coinage. In 1854 he was knighted and appointed governor of Hong Kong. Parliament censured his course in the bombardment of the Chinese forts in 1856, and he was recalled in 1857. His "Kingdom of Siam and its People" (2 vols., London, 1857) embodies his observa-

tions while on a mission in that country for the conclusion of a commercial treaty. "A Visit to the Philippine Islands in 1858-'9" appeared from his pen in 1859. He was a zealous Unitarian, and in 1872 was prominent in the international social reform convention in London.

BOWYER, William, an English printer and scholar, born Dec. 19, 1699, died Nov. 18, 1777. He studied at Cambridge, and became printer to the house of commons and various learned societies. He published several learned works, the most celebrated of which was a Greek edition of the New Testament, with critical and emendatory notes (2 vols., 1763; 2d ed., 1812). His memoirs are included in "Nichols's Literary Anecdotes of the Eighteenth Century" (9 vols., 1812-'15; continued as "Illustrations of Literary History," 1817-'48).

BOX (*buxus*), a shrubby evergreen tree, which affords a very valuable close-grained wood. The Romans cultivated the box tree as an ornamental shrub in their gardens, and consecrated



Box Tree.

it to Ceres. The Greeks called it *πύλος*, whence the Latin name; and as the same Greek word signifies goblet or vase, it is probable that they named it from its use in the manufacture of small cups and ornaments. *B. sempervirens*, the best known species, is the most northern arborescent plant of the natural order *euphorbiaceae*, the other trees of that order being found only in mild or tropical climates. It is a native of most parts of Europe, is common from England to Persia, and attains in favorable localities the height of 15 or 20 ft., but in some rocky regions never rises above 3 ft. It has small oval and opposite leaves, male and female flowers upon the same individual, and a 3 or 4-parted calyx. Among the garden varieties is the dwarf box, much used for the edgings of walks. The wood is of a yellowish color, hard, heavy, durable, close-grained, and susceptible of a high polish. It has a specific gravity of

1828. It is prepared for industrial uses by steeping large blocks in water during 24 hours, after which it is boiled in water, and then allowed to dry slowly, immersed in sand or ashes



Leaves and Fruit of Box.

to exclude the air and prevent rapid desiccation. It is much used by the turner, the mathematical instrument maker, and the wood engraver, and for certain uses no other kind of wood can replace it with advantage. It is sent in large quantities from Spain to Paris, and great quantities of a very fine quality are imported from the Levant into the manufacturing countries of Europe. The *B. Balearica*, or Majorca box, is a handsomer plant than the preceding, having wide leaves, but requires a warmer climate or more careful culture. It will grow, however, in the open air, in the milder exposures of northern latitudes. It abounds on the hills of Majorca at the height of 1,500 ft. above the level of the sea, and is supposed to furnish a part of the Spanish and Turkey box wood. Box wood is sometimes used in medicine as a substitute for guaiacum, and the leaves have been employed as a substitute for Peruvian bark. The leaves have also been used instead of hops in the brewing of beer, but they give an acrid, unpleasant flavor to the liquor.

BOX ELDER, a N. W. county of Utah, bounded N. by Idaho and W. by Nevada; area, 6,000 sq. m.; pop. in 1870, 4,855, of whom 403 were Chinese. About half of Great Salt lake lies in the S. E. part of the county. Bear river flows through the E. part. The surface is broken. The Central Pacific railroad traverses the county. The chief productions in 1870 were 26,972 bushels of wheat, 4,589 of Indian corn, 2,324 of oats, 4,240 of barley, 10,692 of potatoes, 1,784 tons of hay, 3,394 lbs. of wool, and 3,910 gallons of sorghum molasses. There were 484 horses, 801 milk cows, and 2,582 sheep. Capital, Brigham City.

BOXING. See **PUGILISM**.

BOYACÁ. I. An inland state of the United States of Colombia, divided into the provinces of Pamplona, Casanare, Socorro, and Tunja, and bordering upon Venezuela and the states of Cundinamarca and Santander; area, 33,349 sq. m.; pop. in 1870, 482,874. The capital is Tunja, once the court of the Zaque kings, the implacable enemies of the Zipas of Bogotá. The face of the country is traversed in the west by a chain of the Andes, and slopes toward the east into immense llanos or plains, little cultivated, and covered in part by dense forests and marshes, and in part by luxuriant pastures watered by the Meta and other tributaries of the Orinoco. Along the banks of the former river are almost the only inhabitants to be found in this region. The S. part of the state is intersected by morasses. The soil in some places is remarkably fertile; the lowlands yield in abundance all the tropical fruits and vegetables, as also cotton, cacao, sugar, tobacco, dyes, medicinal drugs, and an infinite variety of useful timber. The productions of the highlands are similar to those of Europe. Honey is plentiful, and the preserves from this state are much esteemed. Vapors from numerous thermal springs in the south are condensed in dry weather and cover the surrounding fields with sulphate of soda, which is sold in the plains for the use of cattle at a high price. Near Tunja there are springs cold by day and very hot by night. The climate on the plains is hot and unhealthy, and fevers are common; in the valleys of the west and centre, though warm, it is very salubrious; in the highlands it is much cooler, but, as in most alpine regions, the inhabitants suffer very much from goitre, due in some localities to the use of impure water. Coarse cotton and woollen cloths, blankets, and flannels are manufactured, as also straw hats; and there are dyeworks, powder mills, tanneries, and spinning mills, and a considerable internal traffic. Cattle are extensively raised. Emeralds and some gold are found, but the mines are no longer worked. There are some lead mines in Socorro, as also fossil remains of colossal mammals. The forests are infested by jaguars, wild cats, *mapurites* (species of badger), hideous snakes, *coyas* (venomous spiders), and green mosquitoes formidable on account of a worm which they deposit in the skin whenever they bite. II. A small town of the above described state, on the road from Tunja to Bogotá, 12 m. from the former, in lat. 5° 20' N., lon. 73° 39' W. It is celebrated for the victory gained by the forces of New Granada, commanded by Bolivar, over the Spaniards, the whole of whose surviving troops, with arms, ammunition, and baggage, fell into the hands of the victor. This battle, fought Aug. 7, 1819, near the bridge of Boyacá, was decisive of the independence of New Granada. A college was established here in 1821.

BOYAR, or **Belar** (from *boi*, battle), a Slavic title, first especially used by the Bulgarians,

Serbs, and Russians, and afterward by the Moldavians and Wallachians. It represented the highest social condition, corresponding in certain respects to that of an English peer. In ancient Russia the boyars were the next after the princes of the blood, and formed a kind of supreme political body, acting as the council of the grand dukes. All the higher offices, civil and military, including the lieutenancies in the provinces, were held by them. While Russia was divided into petty sovereignties, the boyars enjoyed the right of choosing for themselves and for their dependants the prince whom they wished to serve, and of leaving his service at pleasure. When the grand dukes of Vladimir and of Moscow stripped these petty princes of their sovereign rights, the dignity of boyars was granted to them, and their influence often equalled that of the grand dukes, the ukases always containing the words, "approved by the boyars." Precedence among the boyars was according to the creation of the title, which was hereditary; and in the 16th and 17th centuries any boyar of an older creation refused to serve under one of a younger. This struggle for precedence, which was especially troublesome in times of war, was ended by Fedor III., and Peter the Great wholly abolished the dignity of boyar. In Roumania the boyar nobility, though not of national origin, sat in the council of the hospodars, and exercised a preponderating influence till 1864, when it was checked by Prince Cuza.

BOYCE, Hector. See БОЯЧУС.

BOYCE, William, an English composer, born in London in 1710, died in February, 1779. He was the son of a mechanic, and was placed under the tuition of Charles King, choir master of St. Paul's cathedral. When his voice changed he commenced the study of harmony and the organ, and became organist first at the Oxford chapel, and subsequently at St. Michael's, and composer for the royal chapel. He received the degree of doctor of music from Cambridge university in 1749. In 1758 he became conductor of the royal orchestra, directing in that capacity the music at the triennial gatherings of the cathedral choirs of Worcester, Hereford, and Gloucester. His principal compositions are church services, which are still held in high esteem and are in constant use both in England and the United States. Several years of his life were devoted to the collection and publication in score of the best works of the composers of English church music from the earliest times to his own. He wrote also 12 trios for two violins and bass, eight symphonies, and many anthems of much excellence. One of the latter, "Blessed is he that considereth the poor," is sung every year at the festival given for the sons of the clergy. He also wrote two musical dramas entitled "The Chaplet" and "The Shepherd's Lottery." He was buried in St. Paul's cathedral.

BOYD, a N. E. county of Kentucky, separated on the N. E. from Ohio by the Ohio river, and

on the E. from West Virginia by Big Sandy river; area, 230 sq. m.; pop. in 1870, 8,578, of whom 291 were colored. The surface is generally hilly. Iron ore and stone coal are abundant. The chief productions in 1870 were 11,718 bushels of wheat, 168,199 of Indian corn, 17,968 of oats, 12,598 of potatoes, and 1,269 tons of hay. There were 850 horses, 945 milch cows, 1,908 other cattle, 3,843 sheep, and 3,999 swine. Capital, Oatletsburg.

BOYD, Andrew Kennedy Hutchison, D. D., a Scottish clergyman and essayist, born at Auchinleck, Ayrshire, in November, 1825. He was educated at the university of Glasgow; became a minister of the established church of Scotland in 1851, and officiated successively in the parishes of Newton-on-Ayr, Kirkpatrick-Irongray in Galloway, St. Bernard's in Edinburgh, and at St. Andrews, where he still remains. His writings, which originally appeared in magazines, have been republished separately. They include "Recreations of a Country Parson" (two series, 1860 and 1861), "Leisure Hours in Town" (1862), "Graver Thoughts of a Country Parson" (1863), "Counsel and Comfort Spoken from a City Pulpit," "Autumn Holidays of a Country Parson," and "Present Day Thoughts" (1870).

BOYD, John Parker, an American soldier, born in Newburyport, Mass., in 1768, died in Boston, Oct. 4, 1830. He entered the United States army in 1786, but soon afterward went to India, where he raised three battalions, each of about 500 men, with a few English officers, whom, as well as his men, he hired at a certain amount per month. The equipment, including guns and elephants, was his sole property, and he let out the services of his little army to any of the Indian princes who would give him the best pay. The demand for his services diminishing, he sold out, and in 1808 returned to the United States, and took part as colonel in the battle of Tippecanoe, Nov. 7, 1811. He was afterward appointed brigadier general, put at the head of a detachment of 1,500 men of Wilkinson's army in the expedition to Upper Canada, and fought the battle of Chrystler's Farm, Nov. 11, 1813. He published "Documents and Facts relative to Military Events during the late War" (1816).

BOYD, Mark Alexander, a Scottish scholar and soldier, born at Galloway, Jan. 18, 1562, died at Pinkill, April 10, 1601. His headstrong temper made him quarrel with his relatives and instructors, and before he had finished his academic course he sought his fortune at court, where one duel and numberless broils soon made him notorious. He went to France, where he studied civil law, and thence to Italy. In 1587 he joined the Catholic league as a volunteer soldier, though himself a Protestant; but in 1588 he resumed his legal studies at Toulouse, where he was imprisoned for his religious opinions. He was permitted to escape to Bordeaux, and for some years his life alternated between war and study. His

elder brother's death in 1595 induced him to return to Scotland. He had previously endeavored to win the favor of James VI. by dedicating to him a volume of Latin poems, published at Antwerp in 1592. Some other of his Latin poems are to be found in the *Delicia Poetarum Scotorum*. He was a thorough master of Greek, and translated Cæsar's Commentaries into that language. Lord Hailes wrote a "Sketch of the Life of Boyd" (1783).

BOYD, Zachary, a Scottish divine, died in Glasgow about 1653. He studied in Scotland and France, became professor at Saumur, and after his return home on account of the persecutions of the Protestants, he was pastor of the parish church and thrice rector of the university of Glasgow. He wrote many works, chiefly polemical, among which is "The Last Battell of the Soule in Death" (2 vols., Edinburgh, 1629; new ed., with his biography by Gabriel Neil, Glasgow, 1831). He also wrote the metrical paraphrase of the Scriptures popularly called "Zachary Boyd's Bible," bequeathed, with many other manuscripts and a large sum of money, to the university of Glasgow, in whose library it remains in MS.

BOYDELL, John, an English engraver and print publisher, born Jan. 19, 1719, died in London in December, 1804. He was educated for the church, but apprenticed himself in 1740 for seven years to a London engraver. His first publication was the "Bridge Book," so called because there was a bridge in each of the views which it contained. In 1746 he published by subscription a volume of engravings, wholly executed by himself, containing 152 views in England and Wales. The profits of this volume enabled him to become a regular publisher, and to employ good artists; and in a few years the engravings of Boydell were largely exported to the continent. He established the "Shakespeare Gallery" in Pall Mall as an English school of historical painting, and employed Reynolds, Opie, West, Northcote, and other eminent painters, in illustrating Shakespeare's works. From these pictures the best engravers produced the celebrated work (3 feet by 2 in size), in royal elephant folio, entitled "A Collection of Prints from Pictures painted for the purpose of illustrating the Dramatical Works of Shakespeare." It appeared in 1803 (having been preceded, in 1792-1801, by Boydell's edition of Shakespeare, printed by Bulmer, 9 vols. folio), and the sum of £350,000 had been expended upon it. When he commenced this project, he had every reason to expect that, as with his previous productions, his foreign customers would take a considerable number of copies. But the war had injured foreign trade, and in 1804 he was compelled to solicit parliament to authorize him to dispose of the original paintings by lottery. He was alderman of London in 1782, sheriff in 1785, and lord mayor in 1790. The plates of Boydell's illustrations of Shakespeare were purchased in a damaged condition by an Ameri-

can, Dr. S. Spooner, brought to the United States, and retouched, and a new edition was printed from them.

BOYER, Abel, an English historian and lexicographer, born at Castres, France, June 13, 1664, died at Chelsea, Nov. 16, 1729. He was a French Protestant refugee who settled in London in 1689, and was for some time a teacher. He figures in Pope's "Dunciad," and compiled the "Political State of Great Britain," a monthly publication, continued till 1740, making 60 vols. 8vo.; "Annals of the Reign of Queen Anne" (11 vols.); "History of William III." (3 vols.); and, besides other works, published a "Life of Sir William Temple" (1714). He also wrote a French-English dictionary and grammar, which remained in very general use almost to the present time.

BOYER, Alexis, baron, a French surgeon, born at Uzerche, Limousin, in March, 1757, died in Paris, Nov. 25, 1833. He was the son of a poor tailor, went to Paris as assistant to a drover, and acquired his first knowledge of surgery while employed as a barber. In 1795 he became professor of operative medicine, and afterward chief surgeon of Napoleon, who made him a baron with a revenue of 25,000 francs, which he lost after the restoration, though remaining in the service of Louis XVIII., Charles X., and Louis Philippe. He succeeded Deschamps in 1825 as chief surgeon of the Charité, and a member of the institute of France. His best works are, *Traité complet d'anatomie* (4 vols., Paris, 1797-9), and *Traité des maladies chirurgicales* (11 vols., 1814-'26), of which many editions have appeared in France, and translations in Germany. With Corvisart and Roux he edited the *Journal de Médecine, Chirurgie et Pharmacie* (1798-1817).

BOYER, Jean Pierre, a mulatto general and president of Hayti, born in Port-au-Prince in February, 1776, died in Paris, July 9, 1850. He was educated in France, and on his return to Hayti joined the revolted blacks, then struggling against the French for their independence. When the French gave up Fort St. Nicolas to the English, Boyer fought against the latter, and distinguished himself in the defence of the fort of Birotton, and in other dangerous enterprises. Soon afterward Toussaint l'Ouverture separated from the mulattoes, and Boyer, Pétion, and others, retired to France. Boyer was appointed by Bonaparte a captain in the expedition fitted out in 1801, under Gen. Leclerc, and after its disastrous termination left the French service. In 1806 he served under Pétion as commander of Port-au-Prince, and repelled the attacks of Christophe, who held part of the island with the title of emperor. At the death of Pétion in 1818, Boyer was elected president; and after the death of Christophe in 1820, the empire was united to the republic. In 1824 Boyer annexed Santo Domingo, the Spanish part of the island, thus uniting the whole of Hayti. The country advanced during the earlier years of his adminis-

tration, but afterward he became arbitrary and reckless. Intimidated in 1825 by the appearance of a French squadron, he submitted to the claims of France, who demanded a monopoly of the trade and a compensation of 150,000,000 francs for the confiscated estates of the white planters. The Haytians, oppressed by the debt he had foolishly brought upon them, rose in rebellion against him in 1842. He fled to Jamaica, and after the outbreak of the French revolution of Feb. 24, 1848, went to Paris, where he died.

BOYLE, a central county of Kentucky, bounded N. E. by Dick's river, a branch of the Kentucky; area, 180 sq. m.; pop. in 1870, 9,515, of whom 3,679 were colored. The Lebanon branch of the Louisville and Nashville railroad passes through it. Danville is connected with Lexington by the Kentucky Central railroad. The surface is diversified, and the soil deep and rich, underlaid by extensive beds of limestone. The chief productions in 1870 were 99,316 bushels of wheat, 14,789 of rye, 272,505 of Indian corn, 58,115 of oats, and 14,481 gallons of wine. There were 28,035 horses, 1,496 milch cows, 4,358 other cattle, 3,811 sheep, and 12,663 swine. Capital, Danville.

BOYLE, a town, parish, and barony of Ireland, in the county of Roscommon, 108 m. N. W. of Dublin; pop. of the town about 4,000. The river Boyle divides it into a new town, which is well built and has a handsome sessions house, and an old town, with the remains of Boyle abbey and other ancient buildings. The old manor house of the King family is used for barracks. The Irish "Annals of Boyle," extending from 420 to 1245, have been published in English and Latin.

BOYLE. I. Richard, earl of Cork, an English politician, born at Canterbury, Oct. 3, 1566, died Sept. 15, 1643. He was born a commoner, and became clerk to Sir R. Manwood, chief baron of the court of exchequer. Not seeing any prospect of advancement, he went to Ireland, where he married a lady who died and left him a landed estate worth about £500 a year. His abilities, and the growth of his possessions, raised him up a host of enemies and detractors; and the rebellion of Munster reduced him to poverty. He returned to England, and visiting Ireland again in the suite of the earl of Essex, his presence renewed the malice of his detractors, who having brought formal charges against him, he pleaded his cause with such force before Elizabeth in person that the queen took him into favor. He was made clerk of the council of Munster, and bought considerable estates, which he colonized with Protestant tenants, and managed so well as to call forth a remark from Cromwell, that had there been an earl of Cork in each county there had been no rebellion. In 1616 he was created Baron Boyle of Youghal, in 1620 earl of Cork, and in 1631 lord high treasurer of Ireland, which office was made hereditary in his family.

His "True Remembrancer of his Life" is included in Dr. Birch's "Life of Robert Boyle" (London, 1766). **II. Roger**, third son of the preceding, born in Ireland, April 26, 1621, died Oct. 16, 1679. He was known as Lord Broghill during the protectorate, and earl of Orrery in the reign of Charles II. He was won to the cause of the commonwealth in Ireland by Cromwell, at a period when he was known to be engaged in favoring the return of Charles II., and was of material assistance in reducing Ireland to subjection. After the protector's death he was one of Richard Cromwell's privy council, but favored the restoration of Charles II. He wrote a romance, "Parthenissa" (3 vols., 1665), and many tragedies, comedies, and poems, besides "State Letters," published in 1742. **III. Robert**, 5th son and 14th child of the first earl of Cork, born at Lismore castle, Ireland, Jan. 25, 1626, died in London, Dec. 30, 1691. At Eton, whither he was sent at nine years of age, he showed irregular application and development, and after four years was placed under the care of private tutors. With M. Marcombes, a Frenchman, he travelled on the continent. He returned to England in 1644, his father having meanwhile died, and left him property in Ireland and the Stalbridge estate, where he chiefly resided from 1646 to 1650, occupied in study, especially of chemistry. At this time he was one of a society of learned men, called by him the "Invisible College," out of which ultimately grew the royal society. In 1652 he went to Ireland on private business. After his return he resided at Oxford for the most part, using its advantages for study, and associating with men of science in their investigations, till 1668, when he settled in London, at the residence of his elder sister, Lady Ranelagh. He has been called the inventor of the air pump, which was perfected for him in 1658 or 1659 by Robert Hooker, then his chemical assistant, and by it Boyle demonstrated the elasticity of the air. He also associated and corresponded with eminent oriental and Biblical scholars. On the restoration Boyle was favorably received at court, and urged to enter the church; but he thought he could serve religion better as a layman, and published in 1660 "Some Motives and Incentives to the Love of God," which was several times reprinted and translated into Latin. In 1662 a grant was made him of a lease of forfeited impropriations in certain parishes in Ireland, but he relinquished all private benefit, and appropriated two thirds of the net proceeds to the wants of the parishes, and printed the church catechism and the New Testament in Irish at his own expense. The other third he gave to the society for propagating the gospel in New England, of which he was afterward made governor. In 1663 he was one of the first council of the newly incorporated royal society. He became a director of the East India company, helping to procure its charter. In 1676 he wrote a letter

pressing upon that body the duty of promoting Christianity in the East, and in 1677 he caused the Gospels and the Acts to be translated into Malay at his cost by Dr. Thomas Hyde, and gave a large reward to the translator of Grotius's *De Veritate* into Arabic. A selection of his works was published in Latin at Geneva in 1677, though without his consent or knowledge. In 1680 he was elected president of the royal society, but declined from a conscientious scruple. He gave pecuniary aid to Burnet while the latter was compiling his "History of the Reformation." The revolution cut off his resources from Ireland, and his health being impaired, he resigned his presidency of the society for the propagation of the gospel in 1689. His sister, with whom he had lived for 28 years, died in 1691, and he did not survive her a week. Boyle was tall, pale, and of delicate health. He never married. His habits were very careful, regular, and abstemious, and he was noted for reverential piety. His philosophical experiments gave him a very high reputation in science, and he has been called "the great Christian philosopher." His works, with an autobiography, were published in London in 1744, in 5 vols. folio. Among them may be mentioned the "Disquisition into the Final Causes of Natural Things," "Free Inquiry into the received Notions of Nature," "Discourse of Things above Reason," "Considerations about the Reconcilableness of Reason and Religion," "Excellency of Theology," and "Considerations on the Style of Scripture."

IV. Charles, 4th earl of Orrery, born at Chelsea in August, 1676, died in August, 1781. He was the great-grandson of the first earl of Cork, and second son of the second earl of Orrery. He was educated at Christ Church, Oxford. An edition of the epistles of Phalaris, the preface of which contained a disparaging allusion to Richard Bentley, having been published under his name, he became complicated in a famous controversy between Bentley, Atterbury, and other scholars. (See BENTLEY, RICHARD.) In 1700 Mr. Boyle was elected to parliament, and in 1703 he succeeded to the title of earl of Orrery. He served as major general under Marlborough in Flanders, and after the treaty of Utrecht in 1713 was sent as envoy to the states of Brabant and Flanders, and created a peer of Great Britain as Lord Boyle. Under George I. he was one of the lords of the bedchamber, but in 1722 was confined six months in the tower for high treason as an accomplice in Sayer's plot. In the latter part of his life he amused himself with philosophical subjects. It was in his honor that George Graham, the inventor, gave the name of the orrery to the instrument exhibiting the planetary revolutions. **V. John**, only son of the preceding, born Jan. 2, 1707, died Nov. 16, 1762. He succeeded his father as earl of Orrery in 1781, and in 1753, on the death of his second cousin, became fifth earl of Cork. In the house of lords he constantly opposed the administration of Sir Robert Walpole. He

edited the dramatic works and state papers of the first earl of Cork, Pliny's letters, and the "Life of Robert Cary, Earl of Monmouth" (1759), and contributed to various periodical publications; but he is best known by his "Remarks on the Life and Writings of Dr. Jonathan Swift, in a Series of Letters" (London, 1751), the publication of which brought upon him a great deal of censure.

BOYLSTON, Zabdiel, an American physician, born at Brookline, Mass., in 1680, died in Boston, March 1, 1766. In 1721, when the smallpox appeared at Boston, the attention of the faculty was called by Cotton Mather to inoculation. Dr. Boylston, the only member of that body who did not treat the communication with disdain, commenced the practice successfully in his own family, and extended it to other cases. But the opposition to the new process was so stubborn that the doctor was in danger of being mobbed, until six clergymen came forward in his support, and the practice approved itself. In 1721 and 1722 he inoculated 247 persons; 39 were inoculated by others; of the whole number only 6 died. During the same period, of 5,759 who had the disease in the natural way, 844 died.

BOYNE, a river of Ireland, which rises near Carberry in the barony of that name, county of Kildare. It is formed by the confluence of several small streams, and after leaving the bog of Allen has a N. E. course to the town of Navan, where it is joined by the Blackwater. After this it flows nearly E. to Drogheda, on its left bank, and 4 m. below that city falls into the Irish channel about 10 m. S. of Dunany point, the headland of Dundalk bay, after a winding course of 60 m. from its source. It is navigable 25 m. from the sea. It has been called the "Boyne of science" on account of the many monastic institutions along its shores, and is celebrated for its scenery, and for its ancient and modern historical associations. The decisive battle between William III. and James II. was fought on the banks of the Boyne, July 1, 1690. An obelisk, erected in 1786, opposite the ford at Oldbridge, marks the spot where William was wounded.

BOYSE, Boys, or Bets, John, an English theologian, born at Nettlehead, Suffolk, Jan. 3, 1560, died Jan. 14, 1648. He was one of the translators of the Bible appointed by James I., and not only executed his own task, which was the Apocrypha, but also that of one of the others. He was also one of the six revisers of the whole. He afterward assisted Sir Henry Savile in his edition of St. Chrysostom. Andrews, bishop of Ely, made him prebendary of his cathedral in 1615. He left many MSS. at his death, one of which, on the text of the Evangelists and the Acts, was published in 1655. Peck's *Desiderata* (2 vols. fol., London, 1732-'5) contains his curious autobiography.

BOZMAN, John Leeds, an American historian and jurist, born at Oxford, Talbot co., Md., Aug. 25, 1757, died there, April 23, 1823. He

graduated at the university of Pennsylvania in 1783, studied law in London, and afterward practised in his native state, where for several years he was deputy attorney general. He wrote a "Historical and Philosophical Sketch of the Prime Causes of the Revolutionary War," in which he praised Washington and depreciated Franklin; but it was suppressed. During the administrations of Washington and John Adams he wrote much in prose and verse for the press, and at a later period contributed to Dennie's "Port Folio." His principal work is his "History of Maryland, from the earliest Settlement in 1633 to the Restoration in 1660," the introduction published in 1811, and the complete work in 1837 (2 vols., Baltimore), under the auspices of the state.

BOZRAH, or *Bostra*, a ruined city of Syria, in an oasis on the S. E. border of the Hauran, 76 m. S. S. E. of Damascus, in lat. 32° 30' N., lon. 36° 24' E. It was one of the chief cities of Bashan, and is about 5 m. in circuit, with

tween the Bozrah mentioned as a town of Edom and the Bozrah of Moab, identifying the latter with the Bostra of the ancients, and the former with Busaïreh between the Dead sea and Petra; while still others contend that none of the Scriptural Bozrahs correspond to the Bostra of Bashan. This city was enlarged and embellished by the Romans, and in the reign of Trajan it was made the capital of the province of Arabia and received the name of Nova Trajana Bostra. Under the emperor Philip it was the seat of a bishop, and afterward of an archbishop. On the invasion of the Saracens it began to fall into decay, and in the reign of Baldwin IV. of Jerusalem (1180) it was ravaged by the Turks.

BOZZARIS, *Marco* (MARCOS BOTZARIS), a Greek patriot, born about 1790, died near Missolonghi, Aug. 20, 1828. His father, Kitzos Bozzaris, his grandfather, uncles, and brothers, were all distinguished patriots and warriors. In 1803, after the fall of Suli, he escaped to the Ionian islands, where he united with other refugees against Turkey. When the treaty of Tilsit restored the Ionian islands to the French, and deprived the Greeks of any hopes of immediate deliverance, he entered the French service as a sergeant in an Albanian regiment, in which his father and uncle served as majors. In 1818 he became a member of the *Hetaïria*, the great central society of the patriots. When in 1820 Ali Pasha took arms against the Porte, Bozzaris with several hundred followers joined him



Ruins of Bozrah.

high walls 15 ft. thick, and a strong castle. Among its ruins are temples, churches, mosques, baths, fountains, aqueducts, and triumphal arches. A straight street intersects the city lengthwise, and has a beautiful gate at each end; and other straight streets cross it. This city anciently contained 100,000 inhabitants; now there are scarcely 20 families. The castle stands on the S. side of the city; its outer walls and towers are still in good preservation. In the centre of this structure, supported on massive piers and arches, are the remains of a theatre 270 ft. in diameter. This fortress is supposed to have been built by the emperor Philip, who was a native of the city.—The town, which the Greeks and Romans called Bostra, is supposed by some Biblical critics, and among them Gesenius, to be identical with the Bozrah of Genesis and the prophets; but others, like Porter, distinguish be-

in Epirus, having first obtained from him the restoration of the Suli mountains. When in 1821 the insurrection against Turkey became general, Bozzaris fought in western Hellas, with varying success. In 1822 he lost the flower of his comrades in a desperate effort to relieve the Suliote stronghold of Kiapha, but continued bravely fighting, until the battle of Peta (July 16) destroyed the *élite* of the patriots. He then threw himself, with a number of Suliotes, into Missolonghi, and was one of its foremost defenders till the end of the campaign. On the reorganization of the national forces in 1828 he was appointed a general in the army of western Hellas. In the night of Aug. 19 he made with Tzavelas and others a combined night attack on the camp of the pasha of Scutari, who was advancing toward Missolonghi at the head of a considerable army. Marco, with 350 Suliotes, fought his way into

the midst of the camp, near Carpenisi, but was killed by a shot in the face while spreading carnage around him. He was borne from the battlefield, after the victory, on the shoulders of a relative, and buried in Missolonghi. The victory, however, which was signal, was not followed up. Marco was no less remarkable for modesty than for patriotism and bravery. His heroism has been commemorated, among others, by Fitz-Greene Halleck, whose poem has been translated into modern Greek.—The only son of Marco, DEMETRIUS BOZZARIS, has been minister of war under various administrations of the Greek government.

BRA, a town of Piedmont, Italy, province of Coni, in the valley and 2 m. N. of the Stura, and 9 m. W. of Alba; pop. about 12,000. It contains the celebrated church of Santa Chiara, built by Vettone in 1742. The environs produce silk of excellent quality, and there is also an active trade in wine, grain, and cattle.

BRABANT. **I. Duchy of**, one of the ancient divisions of the Netherlands, bounded N. by Holland and Gelderland, E. by Limburg and Liège, S. by Namur and Hainaut, and W. by Flanders and Zealand. The Menapii and Tungri were the original inhabitants of this country. By the Romans it was made part of the province of Gallia Belgica. The Franks settled in it in the 5th century. It successively formed part of Austrasia, of the Carolingian kingdom, of the kingdom of Lorraine, and of the duchy of Lower Lorraine. When Duke Otho died childless in 1005, Godfrey, count of Ardennes, became count of Brabant; and in 1190 Brabant was made a duchy. In 1349 Duke John III. received from the emperor the golden bull of Brabant, according to which no Brabançon could appeal to a higher court of judgment than that of the duke of Brabant. Duke John's eldest daughter, Joanna, bequeathed the duchy to her nephew, Anthony, second son of Philip the Bold, duke of Burgundy (1405). Duke Anthony fell on the French side, at the battle of Agincourt. With Philip, the younger brother of Anthony, the line of dukes terminated. Brabant passed to Philip the Good, duke of Burgundy (1480), and remained an integral part of the duchy of Burgundy until, in 1477, Maximilian, the future emperor of Germany, married Mary, the heiress of Charles the Bold of Burgundy. Brabant then passed under the dominion of the house of Austria. The emperor Charles V. left it to his son Philip II. of Spain. In the revolt of the Netherlands Brabant was among the first to join, but was not successful in its efforts. At the peace of Westphalia (1648) the northern part was abandoned to the United Provinces, and received the name of North Brabant; at the same time the provinces of Antwerp and Mechlin were cut off from the ancient limits of the duchy, and erected into separate territories under Spanish rule. The remaining part was called thenceforth South Brabant, and remained a part of

the hereditary possessions of the Spanish crown until the war of Spanish succession, at the end of which it reverted to Charles VI., afterward emperor of Germany, together with Antwerp and Mechlin, and was thenceforward known as part of the Austrian Netherlands. Both Brabants were conquered by the French in 1794. Under them North Brabant formed the department of Bouches-du-Rhin, and South Brabant the department of La Dyle and a part of Deux-Nèthes. At the congress of Vienna (1814) both Brabants were given to the king of Holland. In the revolution of 1830, South Brabant joined the revolt of the provinces which had formerly been the Austrian Netherlands, and it has since formed part of the kingdom of Belgium, while North Brabant remains part of the kingdom of Holland. **II. North**, a province of Holland, bounded N. by the provinces of Holland and Gelderland, E. by Limburg, S. by Limburg and Antwerp, and W. by Zealand; area, 1,980 sq. m.; pop. in 1870, 440,302. It is divided into the arrondissements of Bois-le-Duc, Breda, and Eindhoven; capital, Bois-le-Duc. The principal rivers are the Maas, the Dommel, the Dintel, the Donge, and the two rivers Aa. There are numerous canals. Agriculture is in an advanced condition. Mutton, poultry, bees, game, and fish are abundant. Pine is the principal tree; of minerals the country is entirely destitute. The linen, cotton, cutlery, and porcelain manufactures are highly prosperous; and the inhabitants, chiefly Roman Catholics, are distinguished for their industry and frugality. **III. South**, the metropolitan province of Belgium, bounded N. by Antwerp, E. by Limburg and Liège, S. by Namur and Hainaut, and W. by East Flanders; area, 1,268 sq. m.; pop. in 1869, 862,982. It is divided into the arrondissements of Brussels, Louvain, and Nivelles; capital, Brussels. A part of the inhabitants speak Flemish and others Walloon; the great majority are Roman Catholics. The soil is flat, and in some places wooded. It is watered by the Dyle, the Dender, and the Senne. The climate is rather moist, but healthy. The agriculture is of the first quality, the land being cultivated like a garden. The products are rye, wheat, oil seed, and buckwheat, but little fruit. Cattle are reared, mostly oxen and horses; so are bees. Its manufactures are of woollen and cotton stuffs, linen, Brussels lace, leather, hats, playing cards, tobacco, starch, brandy, paper, and oil. South Brabant is intersected by several railroads and canals.

BRACCIOLINI. See POGGIO.

BRACE, Charles Loring, an American clergyman and author, born at Litchfield, Conn., in 1826. He graduated at Yale college in 1846, and afterward studied theology in the theological department of that institution, and at the Union theological seminary, New York. He has since been a recognized preacher, but has not been connected with any church. In 1850 he made a pedestrian journey in Great Britain

and Ireland, also visiting the Rhine, Belgium, and Paris. An account of part of this journey was afterward published by his companion, Mr. Frederick Law Olmsted, under the title of "Walks and Talks of an American Farmer in England." In the following year he visited Hungary, where he was arrested on suspicion of being a secret agent of Kossuth, and tried before a court martial, but, through the efforts of C. J. McCurdy, United States chargé d'affaires at Vienna, was soon released. He afterward visited Switzerland, England, and Ireland, giving special attention to schools, prisons, and reformatory institutions. Returning to the United States in 1853, he became associated in the labors of the Rev. Mr. Pease among the most degraded class of the city of New York, and was chiefly instrumental in the formation of the "Children's Aid Society," an association for transferring destitute and vagrant children to homes in the country, and which also to a large extent provides lodgings, instruction, and other aid for poor boys and girls in the city. Of this society he is still (1873) the secretary and principal agent. In 1856 he made a journey in northern Europe, and in 1872 revisited Hungary, where he was received with marked attention. He has published "Hungary in 1851" (1852); "Home Life in Germany" (1853); "Norse Folk," a description of the religious, social, and political condition of the people of Sweden and Norway (1857); "Races of the Old World" (1863); "The New West" (1869); "Short Sermons for Newsboys;" and "The Dangerous Classes of New York" (1872).

BRACE, Julia, a blind deaf mute, born at Newington, Conn., in 1806. She lost both sight and hearing at the age of 4½ years, and soon forgot the few words she had learned to speak. In 1825 she entered the American asylum for the deaf and dumb at Hartford, and remained there about 80 years, when she went to Bloomfield, Conn., where she still resides with a sister (1873). As compared with other blind deaf mutes, she seems possessed of only ordinary abilities. In all that concerns outward and material nature she manifests much intelligence. She possesses great tenacity of memory and nice powers of discrimination, being able to distinguish readily articles belonging to different persons. She keeps herself apprised of the progress of time, days, weeks, and months, and notes the return of the Sabbath. In her intellectual education she has made little progress; a few facts have been acquired, but soon forgotten. It is doubtful if she possesses any distinct idea of God, but she seems to have a sense of right and wrong. She has never been guilty of theft, falsehood, or any deliberate wickedness; and while tenacious of her own rights, she will not knowingly invade those of others.

BRACHIOPODA, or *Brachiopods* (Gr. *brachion*, arm, and *πους*, foot), till within a few years universally regarded as one of the classes of

mollusca, named by Cuvier from two long, ciliated arms, which project from the side of the mouth, and with which they create currents that bring them food. By De Blainville and Owen they were called *palliobranchiata*, from *pallium*, a mantle, and *branchia*, gills, the delicate mantle covering the body constituting the respiratory apparatus of the animals. They are bivalve, differing from the conchifera in the valves being always unequal; yet they are symmetrical and equal-sided. The valves are dorsal and ventral, instead of right and left, the smaller and lower being generally considered the dorsal valve. By the old naturalists they were commonly called *lampades*, or "lamp



Arms of Brachiopod.

shells," from the resemblance of their form to that of the antique lamps; the hole for the wick in these being represented in the shell by the curved beak of the ventral valve, through which the organ passes by which the animal attaches itself to any substance. The brachiopoda all belong to salt water. They are found attached to corals, to other shells, and to the under sides of shelving rocks. Though a low animal type, no other class exhibits such a great range in time, geographical distribution, and depth of water; they are found from the Silurian to the present epoch, from the poles to the tropics, and from near high-water mark to the greatest depths reached by the dredge. Among the earliest forms of animal life were the *lingula* of the lowest fossiliferous rocks. This genus has continued through all the series of formations, during which multitudes of other forms have been introduced and spread through an immense number of species, which have long since disappeared, leaving no type of their family in existence; but the ancient genus *lingula* is still met with in the Pacific and on our Atlantic coast; and the *terebratula* and *discina*, which were introduced in periods nearly as remote, have representatives living in many parts of the world. More than 1,000 extinct species have been described. They constitute a large proportion of the shells found so abundantly throughout the New



Terebratula septentrionalis.

York system, as the *spirifer*, *productus*, *atrypa*, *strophomena*, &c. They were most numerous in the Silurian and Devonian epochs, since which they have been declining; there were about 700 in the palæozoic age, not more than 200 in the cretaceous period, and there are fewer than 100 at the present time, of which the best known genera are *lingula*, *terebratula*, *discina*, *rhynchonella*, and *crania*, all of which are very old forms.—Naturalists have for some

years been of the opinion that the brachiopods and polyzoa form a natural anatomical class, defined by Prof. Hyatt as a sac closed at one end by a disk, surrounded by free tentacles, and perforated by a toothless mouth from which hangs the alimentary canal. Some recently have been inclined to add the ascidians, and to separate the three from the mollusca, under the name of *molluscoida*; the ascidians seem to form the connecting link of the molluscoids with the bivalve mollusks; the first two agree in having but one aperture to the atrial chamber, and a complicated muscular system intersecting the visceral cavities. Prof. E. S. Morse, in "Memoirs of the Boston Society of Natural History," 1871, from the study since 1869 of *terebratulina* and *discina*, in all stages of growth, finds the following articulate characters, which induce him to remove the brachiopods from mollusks: the shell is like that of crustacea in its tubular structure, scale-like appearance, and chemical composition; in *lingula* there is 42 per cent. of phosphate of lime, and only 6 per cent. of carbonate of lime; the horny bristles or setæ fringing the mouth are remarkably worm-like; they are secreted by



Lingula anatina.

follicles, surrounded by muscular fibres, and freely movable. Gratiolet has compared the circulatory system with that of crustacea, and Burmeister has shown the resemblance between the respiratory apparatus of *lingula* and that of certain cirripeds. The oviducts resemble the similar organs in worms in their trumpet-shaped openings; the part bearing the cirri, and the mantle covering the arms, are comparable to similar parts in tubicolous worms. From French and German authors we have many proofs of their affinity with the worms in embryological characters. These views were confirmed by Prof. Morse's study of the living *lingula* on the coast of North Carolina, near Fort Macon. Here he ascertained that they make a tube in the sand, like annelids; the peduncle is hollow, distinctly ringed, with longitudinal and circular fibres, very contractile, and remarkably worm-like; they have also red blood, and the sexes are distinct. His conclusions are that they are "true articulate, having certain affinities with the crustacea, but properly belonging to the worms, coming nearest the tubicolous annelids: they may be better regarded as forming a comprehensive type, with general articulated features." Possibly they have affinities with the mollusks, as homologies have been pointed out between the polyzoa and tunicates or ascidians.

BRACKEN, a N. E. county of Kentucky, bordering on the Ohio river and drained by the north fork of Licking river; area, 200 sq. m.;

pop. in 1870, 11,409, of whom 636 were colored. The soil is generally fertile and productive. The chief productions in 1870 were 30,229 bushels of wheat, 20,610 of rye, 440,530 of Indian corn, 22,583 of oats, and 4,188,039 lbs. of tobacco. There were 3,760 horses, 2,087 milch cows, 2,811 other cattle, 3,445 sheep, and 12,719 swine. Capital, Augusta.

BRACKENRIDGE. I. **Hugh Henry**, an American judge and author, born near Campbellton, Scotland, in 1748, died at Carlisle, Penn., in 1816. In 1771 he graduated at Princeton college, where he subsequently acted as tutor. Having studied divinity, he became a chaplain in the continental army; but he soon relinquished the pulpit for the bar, and edited for a time the "United States Magazine" at Philadelphia. In 1781 he established himself at Pittsburgh, and in 1799 was appointed a judge of the supreme court of the state, which office he held till his death. He participated with Gallatin in the whiskey insurrection, and vindicated his course in the "Incidents of the Insurrection in Western Pennsylvania, in 1794," published in 1795. His "Modern Chivalry, or the Adventures of Captain Farrago," a humorous and political satire, has been especially popular throughout the West. The first portion was published at Pittsburgh in 1796, and was republished in Philadelphia in 1846, with illustrations by Darley. The second portion was published 10 years after the first, and both were issued together in 1819. He also wrote many miscellaneous essays and fugitive verses. II. **Henry M.**, an American lawyer, diplomatist, and author, son of the preceding, born in Pittsburgh, Penn., May 11, 1786, died there, Jan. 18, 1871. At 20 years of age, having been admitted to the bar, he commenced practice in Somerset, Maryland. In 1811 he was appointed deputy attorney general for the territory of Orleans, afterward the state of Louisiana, and the next year was made district judge. During the war of 1812 he gave the government valuable information, and afterward wrote a history of the war, which was translated into French and Italian. He joined with Mr. Clay in advocating the acknowledgment of the independence of the South American republics. His pamphlet under the name of "An American," addressed to President Monroe, was republished in England and France, and, being supposed to express the views of the American government, was replied to by the duke of San Carlos, the Spanish minister. He was appointed one of the commissioners to the South American republics in 1817, and on his return published his "Voyage to South America," which was said by Humboldt to contain an "extraordinary mass of information." He accompanied Gen. Jackson to Florida in 1821, and in May was appointed judge of the western district, in which office he remained for 10 years. He removed to Pittsburgh in 1832, was elected to congress in 1840, and the year after was named a commissioner under the treaty with Mexico. His

political writings are numerous. In 1859 he published a "History of the Western Insurrection," in vindication of his father.

BRACKETT, I. Edwin E., an American sculptor, born in Vassalborough, Me., Oct. 1, 1819. He has produced portrait busts of Washington Allston, Richard Henry Dana, Bryant, Longfellow, Rufus Choate, Sumner, John Brown, Garrison, Wendell Phillips, Gen. Butler, and others, and a marble group of the "Shipwrecked Mother," now at the cemetery of Mount Auburn, near Boston. **II. Walter M.**, a painter, brother of the preceding, born in Unity, Me., June 14, 1828. He is known chiefly as a painter of salmon, trout, and other varieties of game fish.

BRACTON, Henry de, lord chief justice of England in the time of Henry III., died about 1270. He was educated and took the degree of doctor of laws at Oxford, and about 1244 was made one of the itinerant judges. Ten years later he became chief justice, and held the office 20 years. He wrote *De Legibus et Consuetudinibus Angliæ*, one of the earliest English law books (fol., 1569).

BRADBURN, Samuel, an English clergyman, born at Gibraltar, where his father was stationed with his regiment, Oct. 5, 1751, died July 24, 1815. His parents removed to Chester, England, and he was apprenticed to a shoemaker; but he became a Wesleyan local preacher in 1773, and entered the itinerant ministry in 1774. He shared the troubles of the early Methodist preachers, but his adroit humor and his persuasive eloquence often conquered opposition and made him popular. He was the great natural pulpit orator of Wesleyan Methodism; combining a nobility of person, a scrupulous neatness of apparel, a ready wit, and a genuine pathos, that drew to him multitudes of hearers. In 1799 he was elected president of the Wesleyan conference. His "Sermons on Particular Occasions" (1 vol. 12mo) appeared in 1817.

BRADDOCK, Edward, a British general, born in Perthshire about 1695, died near Pittsburgh, Penn., July 18, 1755. Having served with distinction in Spain, Portugal, and Germany, he was in 1755 sent to take charge of the war against the French in America. He set out soon after his arrival on an expedition against Fort Duquesne (now Pittsburgh). Although unacquainted with Indian warfare, he disregarded the suggestions of Col. Washington, acting as his aide-camp, fell into an ambush of French and Indians near that fort, July 9, 1755, was defeated and mortally wounded, and died after a hasty retreat of 40 miles.

BRADDON, Mary Elizabeth, an English novelist, born in London in 1837. Her father, Mr. Henry Braddon, a solicitor, contributed to sporting papers, and she early exhibited literary talent. In 1860 her comedietta, "The Lover of Arcadia," was performed at the Strand theatre, and in 1861 she published "Garibaldi and other Poems," and a series of tales in the "Temple Bar" and "St. James's" magazines. In 1862

her novel, "Lady Audley's Secret," secured for her a wide reputation, which has been increased by "Aurora Floyd," "Sir Jasper's Tenants," "Only a Clod," and many other sensational and attractive novels, the most recent of which, "To the Bitter End," appeared in 1872. Miss Braddon edits the "Belgravia" magazine.

BRADFORD. I. A N. E. county of Pennsylvania, bordering on New York; area, 1,170 sq. m.; pop. in 1870, 53,204. The Elmira and Williamsport and the Lehigh Valley railroads pass through the county, and there are railroads to the coal mines S. and S. W. from Towanda. It is intersected by the North branch of the Susquehanna, and drained by Towanda, Wyalusing, and Sugar creeks, which afford good water power. The surface is uneven and thickly wooded with pine, hemlock, and sugar maple. The soil is good. Iron, bituminous coal, and sandstone are abundant, but lumber is the principal article of export. The chief productions in 1870 were 285,698 bushels of wheat, 83,991 of rye, 505,841 of Indian corn, 1,114,120 of oats, 382,581 of buckwheat, 541,198 of potatoes, 129,956 tons of hay, 8,704,709 lbs. of butter, and 122,253 of wool. There were 12,181 horses, 85,243 milch cows, 27,275 other cattle, 86,257 sheep, and 12,000 swine. Capital, Towanda. II. A N. E. county of Florida, bounded S. W. by the Santa Fé river; area, 940 sq. m.; pop. in 1870, 3,671, of whom 824 were colored. The Florida railroad passes through the S. E. part. The chief productions in 1870 were 45,708 bushels of Indian corn, 6,170 of oats, 18,273 of sweet potatoes, 295 bales of cotton, 3,096 lbs. of wool, 49 hhds. of sugar, and 8,518 gallons of molasses. There were 375 horses, 2,843 milch cows, 5,768 other cattle, 1,838 sheep, and 4,816 swine. Capital, Lake Butler.

BRADFORD, a market town and parliamentary borough of the West Riding of Yorkshire, England, on an affluent of the Aire, 8 m. W. of Leeds and 29 m. S. W. of York; pop. in 1871,



Bradford Town Hall.

145,827. In its vicinity are the celebrated iron works of Low Moor and Bowling. Bradford is the principal seat of the English worsted

manufacture, both in yarn and in piece. There are also numerous cotton mills, founderies, and manufactories of combs and machinery. A custom house and inland bonding warehouse have been established here. A handsome and commodious town hall was commenced in 1870, to cost £74,000, including £80,000 for land. The town is situated at the union of three extensive valleys, surrounded by picturesque scenery, and has the advantage of many ancient and excellent schools. The Airedale college, for the education of Independent ministers, is at Undercliffe, near Bradford, and a Wesleyan seminary for ministers' sons at Woodhouse Grove.

BRADFORD, Alden, an American author, born at Duxbury, Mass., in 1765, died in Boston, Oct. 26, 1848. He was descended from Gov. Bradford, graduated at Harvard college in 1786, and was settled as pastor of a Congregational church at Wiscasset, Maine, for eight years. He afterward engaged in the book trade in Boston, and from 1812 to 1824 was secretary of state of Massachusetts. He published a history of Massachusetts from 1764 to 1820, a "History of the Federal Government," and many miscellaneous pieces at different times.

BRADFORD, John, an English martyr, born at Manchester about 1510, burnt at Smithfield after a long imprisonment, July 1, 1555. He was appointed chaplain to Edward VI. in 1552, and became one of the most popular preachers in the kingdom. In the reign of Mary he was tried on a charge of sedition and heresy, and sentenced to death. The Parker society published his theological treatises in 1848.

BRADFORD, William, second governor of Plymouth colony, born in Yorkshire, England, in March, 1588, died May 9, 1657. At an early age he emigrated to Holland for the sake of religious liberty, and, having joined the English congregation at Leyden, sailed for America in 1620, in the Mayflower. Upon the death of Gov. Carver in 1621, he was elected to supply his place. One of his first acts was to adopt measures to confirm the league with Massasoit, who afterward disclosed to the colony a dangerous conspiracy among the Indians, which was suppressed. The first legal patent or charter of the colony was obtained in the name of John Pierce; but in 1630 a more comprehensive one was issued in the name of William Bradford, his heirs, associates, and assigns. In 1640 the general court requested him to deliver the patent into their hands, and upon his complying immediately returned it into his custody. He was annually elected governor as long as he lived, excepting five years at different intervals, when he declined an election, holding the office 31 years. Though without a learned education, he wrote a history of Plymouth colony from 1602 to 1647. On the retreat of the British army in 1775, the MS. was carried away from the library of the Old South church in Boston, but was recovered and printed entire by the Massachusetts historical society in 1856. A large

book of copies of letters relating to the affairs of the colony was also lost; but a fragment of it found in a grocer's shop at Halifax has been printed by the same society.

BRADFORD, I. William, the first printer in Pennsylvania, born in Leicester, England, in 1658, died in New York, May 28, 1752. Being a Quaker, he emigrated in 1682, and landed where Philadelphia was afterward built. In 1686 he printed an almanac. In 1692, having printed the alleged seditious writings of George Keith, he was tried for libel. The justice having charged the jury to find only the fact as to the printing, Bradford maintained that they were to find also whether the paper was really seditious, and that "the jury are judges in law as well as the matter of fact." He was not convicted, but having incurred the displeasure of the dominant party in Philadelphia, he removed to New York in 1693, and in that year printed the laws of the colony. On Oct. 16, 1725, he began the first newspaper in New York, called the "New York Gazette." In 1728 he established a paper mill at Elizabethtown, N. J. For more than 50 years he was printer to the government of New York, and for 30 years the only one in the province. **II. Andrew**, an American printer, son of the preceding, born in Philadelphia about 1686, died Nov. 23, 1742. He was the only printer in Pennsylvania from 1712 to 1723. On Dec. 22, 1719, he commenced the "American Weekly Mercury," the first newspaper in Philadelphia; and he gave employment to Benjamin Franklin on his arrival there in 1723. In 1732 he was postmaster. In 1735 he kept a bookstore at the sign of the Bible in Second street; and in 1738 he removed to No. 8 South Front street, to a house which in 1810 was occupied as a printing house by his descendant, Thomas Bradford, publisher of the "True American."

BRADFORD, William, an American lawyer, born in Philadelphia, Sept. 14, 1755, died Aug. 23, 1795. He graduated at Princeton college in 1772, and was admitted to the bar in 1779. In 1776 he joined the militia, and attained the rank of lieutenant colonel; but in consequence of ill health he resigned at the end of two years. In 1780 he was appointed attorney general of Pennsylvania, a judge of the supreme court in 1791, and attorney general of the United States, Jan. 28, 1794. In early life he wrote some pastoral poems in imitation of Shenstone; but his principal production was an "Inquiry how far the Punishment of Death is necessary in Pennsylvania."

BRADFORD, William, an American painter, born in New Bedford, Mass., about 1830. He is of Quaker extraction, and was educated for commerce; but failing in business, he took up painting, and soon acquired facility in making portraits of ships. He practised marine painting for several years at Fairhaven, Mass., and thence made excursions along the New England coast, and northward as far as Greenland, in quest of subjects. His works relate ex-

clusively to the sea and the seashore, and he is an unusually careful delineator of shipping in every form familiar to the coast of North America. Some of his largest and most elaborate compositions have been suggested by his voyages to the higher latitudes. Of these "The Coast of Labrador" and "Crushed by Icebergs" are conspicuous examples. Other characteristic works by him are "The Island of Grand Menan," "Fishing Boats getting under Way," "Fishing Boats at Anchor," "Shipwreck off Nantucket," "Sudden Squall in the Bay of Fundy," and "A Stiff Breeze in the Harbor of Eastport." Many of these have been photographed. He is now (1873) practicing his profession in New York.

BRADLEY, I. A. S. county of Arkansas, bounded W. by Moro bayou and traversed by Saline river; area, 958 sq. m.; pop. in 1870, 8,646, of whom 2,529 were colored. The surface is generally level. The chief productions in 1870 were 4,726 bushels of wheat, 222,825 of Indian corn, 48,356 of sweet potatoes, and 5,177 bales of cotton. There were 1,656 horses, 3,536 milch cows, 5,550 other cattle, 2,544 sheep, and 16,213 swine. Capital, Warren.

I. A. S. E. county of Tennessee, bordering on Georgia and bounded N. E. by Hiwassee river; area, about 400 sq. m.; pop. in 1870, 11,652, of whom 1,700 were colored. The East Tennessee, Virginia, and Georgia railroad, and the Dalton branch of the same, pass through it. The county is well watered. The surface is uneven, and in the south mountainous, with extensive forests. The chief productions in 1870 were 112,341 bushels of wheat, 239,490 of Indian corn, 41,727 of oats, 12,810 of sweet potatoes, and 135,976 lbs. of butter. There were 2,181 horses, 2,455 milch cows, 8,497 other cattle, 9,146 sheep, and 18,683 swine. Capital, Cleveland.

BRADLEY, James, an English astronomer, born at Sherborne, Gloucestershire, in March, 1692, died at Chalford, July 13, 1762. He was educated at Oxford and took orders, but devoted himself wholly to the study of astronomy. He was chosen a fellow of the royal society in 1718, and three years afterward was appointed Savilian professor of astronomy at Oxford. In 1727 he published his brilliant discovery of the aberration of light, and in 1747 the equally valuable discovery of the nutation of the earth's axis. He also made successful researches into the law of refraction, for which he produced an empirical formula. In 1742 he succeeded Dr. Halley as astronomer royal, and in 1751 he received a pension in consideration of the "advantages of his astronomical labors to the commerce and navigation of Great Britain." From his valuable observations, published after his death, Meyer formed his table of the moon, and Bessel drew the elements of his *Fundamenta Astronomiae*.

BRADSHAW, John, president of the court which tried Charles I., born about 1590, died in 1659. He was made chief justice of Chester in

1647, and sergeant in 1648; and on Jan. 10, 1649, the commissioners for trying the king chose him for their president. He performed the duties of the office with dignity and sternness, and declared on his deathbed that if the king were to be tried and condemned again, he would be the first to agree to it. He was made chancellor of the duchy of Lancaster and lord president of the council of state, and received valuable grants from parliament. He opposed Cromwell's elevation to the supreme power, and on the latter's assumption of the protectorate, he was accordingly deprived of the chief justiceship of Chester; but after Cromwell's death he obtained a seat in the council, and was again elected president. Bradshaw left the reputation of a cold and impassive, but upright, conscientious, and heroic republican. He was buried with great pomp in Westminster abbey, but on the restoration his body was taken from the tomb and gibbeted beside those of Cromwell and Ireton.

BRADSTREET, Anne, an American poetess, born in Northampton, England, about 1612, died Sept. 16, 1672. She was the daughter of Gov. Thomas Dudley, and in 1628 married Simon Bradstreet, afterward governor of Massachusetts, with whom she emigrated to New England in 1630. Her poems were published in London in 1650. The volume was entitled "The Tenth Muse, lately sprung up in America," and contained, according to the title page, "a complete Discourse and Description of the Four Elements, Constitutions, Ages of Men, Seasons of the Year, together with an Exact Epitome of the Four Monarchies, viz., the Assyrian, Persian, Grecian, Roman." There was also a dialogue on politics, &c., between Old and New England, "with divers other pleasant and serious Poems." Her verses are distinguished by a great amount of curious and exact learning, especially in natural history, set forth with singular quaintness, and in the most literal manner. A second edition, published at Boston in 1678, contains her "Contemplations," a poem much superior to her other works. Mrs. Bradstreet was the mother of eight children, to whom she alluded in some verses containing these familiar lines:

I had eight birds hatch't in the nest;
Four cocks there were, and hens the rest.
I nurs't them up with pains and care,
For cost nor labor did I spare;
Till at the last they felt their wing,
Mounted the trees, and learned to sing.

A third edition of her "Tenth Muse" appeared in 1758; and her complete works, both prose and verse, edited by the Rev. G. E. Ellis, D. D., were published at Charlestown in 1868.

BRADSTREET, John, an English general, born in 1711, died in New York, Sept. 25, 1774. When a young officer he was ordered to join the British forces in America, and spent the remainder of his life there. He took part in the expedition against Louisburg in 1745, as lieutenant colonel of a colonial regiment, and was in the same year made a captain in the

regular line. In 1746 he was made governor of St. John's, Newfoundland. In 1755 he was ordered to Oswego by Gen. Braddock, and acted as adjutant general to Gov. Shirley. In 1756, while carrying supplies, he was attacked by the enemy in force, but defeated them. He became lieutenant colonel and deputy quartermaster general in 1757, took part in the attack on Ticonderoga in 1758, and soon after was made colonel and quartermaster general. In the same year he led an expedition against Fort Frontenac, and captured it by surprise. He served under Amherst in his expedition against Ticonderoga and Crown Point in 1759, marched against the Indian tribes in the west and made a treaty with them at Detroit in 1764, and was made a major general in 1772.

BRADSTREET, Simon, governor of Massachusetts, born in Lincolnshire, England, in 1608, died at Salem, Mass., March 27, 1697. He was steward to the countess of Warwick, married Anne, daughter of Thomas Dudley, and engaged in the enterprise of founding a colony in Massachusetts. In March, 1680, he was chosen assistant judge, and arrived at Salem in the course of the summer. He became secretary, agent, and commissioner of the united colonies, and in 1662 was despatched to congratulate Charles II. on his restoration, and look after their interests. He was assistant from 1680 to 1679, and from 1678 to 1679 deputy governor; then governor till 1686, when the charter was annulled. When Andros was imprisoned in April, 1689, he was restored to the office, which he held till the arrival of Sir William Phipps in 1692, with the new charter, when he became first council. He was in public service 62 years, except during the brief administrations of Joseph Dudley and Andros.

BRADSTREET, Simon, minister at Charlestown, Mass., born in 1669, died Dec. 31, 1741. He graduated at Harvard college in 1693, and attained a high rank as a preacher and a scholar. He was so subject to hypochondria as to be afraid to preach from the pulpit, but spoke from the deacon's seat, without notes, usually upon the vanity of earthly things.

BRADWARDIN, Bredewardine, or Bredwardine, Thomas, an English scholar and theologian, called "the profound doctor," died Aug. 26, 1849. He was a proctor at Oxford in 1825, and ultimately its chancellor, and afterward chaplain of the bishop of Durham, chancellor of the diocese of London, prebendary of Lincoln, chaplain to Edward III., and in 1849 archbishop of Canterbury. He was consecrated at Avignon in France, being at the time with the king in that country, and hastened to England to enter upon his duties, but died of the plague before his enthronement at Canterbury. He was especially distinguished as a mathematician, and wrote several works on geometry, arithmetic, and the higher mathematics. But his principal work was his essay *De Causa Dei*, in which, according to some writers, he advanced doctrines nearly approaching those of the mod-

ern Protestants. A folio edition of this, edited by Sir Henry Savile, appeared in London in 1618.

BRADY, James Topham, an American lawyer, born in New York city, April 9, 1815, died there, Feb. 9, 1869. His father emigrated from Ireland in 1812, and after teaching a classical school for some years became a lawyer and finally a judge. He educated his son himself, and at the age of 16 James had acquired sufficient knowledge of law to act as junior counsel to his father. He was admitted to the bar at the age of 20, and soon became distinguished for ability, legal learning, and eloquence. He was often intrusted with great civil cases, which he managed generally with success. But it was as a criminal lawyer that he gained the highest reputation. In a single week he defended four clients charged with murder, all of whom were acquitted. Of the 52 capital cases in which he was counsel, in only one was he unsuccessful, and in that his client was tried as a spy and a guerilla before a court martial. In politics he was a zealous democrat, but he declined to accept any office but that of corporation counsel, which he considered a professional one. He consented in 1860, however, to be the candidate of the ultra states rights party for governor, because there was no chance of his election. During the civil war he gave a general support to President Lincoln's administration, and near the close of it he accepted an appointment as one of a commission to go to New Orleans to investigate the management of the department of the gulf under Gen. Butler and Gen. Banks. The commission made a voluminous report, which has never been published. Mr. Brady wrote much for the magazines and other periodicals, and one of his contributions, which appeared in 1846 in the "New World," entitled "A Christmas Dream," subsequently became popular as a holiday book.

BRADY, Nicholas, an English divine, born at Bandon, Ireland, Oct. 28, 1659, died at Richmond, near London, May 20, 1726. He was partly educated at Oxford, and partly at Trinity college, Dublin. In the revolution he sided with King William, who made him one of his chaplains. In 1726, just before his death, he published a poetical translation of Virgil's *Æneid*, now unknown; also a tragedy, and numerous sermons. His reputation mainly rests on a metrical version, in conjunction with Nahum Tate, of the Psalms of David.

BRAG, a game at cards, deriving its name from the efforts of the players to impose upon the judgment of their opponents by boasting of better cards than they possess. The number of players is usually from four to eight. The game is played with the entire pack of cards, which rank as at whist, except the knaves and nines. These are called "braggers," and rank the same as any cards they may be held with. Thus, an ace and two knaves or nines, or one of each, are called three aces; a deuce and two braggers, three deuces; a king and one bragger, two kings, and

so on. The best hand is a pair royal, *i. e.*, three cards of one kind, the highest being three aces; the next is the highest pair, and then the highest single card. Stakes are put up by each player, after which the cards are shown and the best hand wins.

BRAGA (anc. *Bracara Augusta*), a city of Portugal, in the province of Minho, 33 m. N. by E. of Oporto; pop. in 1864, 19,514. It is situated on an eminence between the rivers Cavado and Desta, and is surrounded by old walls and defended by a fortress. It is the archiepiscopal see of the primate of Portugal, and contains a fine Gothic cathedral, the palace of the archbishop, and a large number of fountains. In the vicinity is the remarkable pilgrimage chapel of the *Bom Jesus*, which stands on the summit of a steep hill, whence there is a magnificent view of the city and of its picturesque environs. Many articles of common use are largely manufactured here, and there are weekly markets and two important annual fairs. The town is supposed to have been founded by the Carthaginians. There are considerable remains of its Roman occupation. It was afterward the capital of the Suevi, and one of the most prominent towns in the early history of Portugal.

BRAGANÇA, or *Braganza*, a town of Portugal, capital of the province of *Tras-os-Montes*, 103 m. N. E. of Oporto; pop. in 1864, 5,101. It has the ruins of an ancient castle, one of the finest feudal remains in Portugal. It is the see of a bishop, and has some manufactories of silks and velvets. Bragança has given its name to the present royal family of Portugal.

BRAGANÇA, House of, the reigning house of Portugal, derived from Affonso, duke of Bragança, a natural son of John I., king of Portugal. The constitution of Lamego, 1189, declares that no foreign prince can succeed to the throne; consequently in 1578, on the death of King Sebastian in Africa, without issue, his people had recourse to the illegitimate line of Bragança. Philip II. of Spain, however, claimed the throne, and successfully supported his pretensions by an army under the duke of Alba. Philip and his successors on the Spanish throne continued to rule Portugal till 1640, when the Portuguese shook off the Spanish yoke and proclaimed Dom João, the then duke of Bragança, their king. He assumed the title of John IV., and the line of Bragança has continued to rule Portugal till the present time.

BRAGG, Braxton, an American general in the confederate service, born in Warren county, N. C., about 1815. He graduated at West Point in 1837, was appointed lieutenant of artillery, and served mainly in Florida till 1843, during the war with the Seminoles; from 1843 to 1845 he was stationed at Fort Moultrie, in Charleston harbor, and just before the breaking out of the war with Mexico was ordered to Texas. In May, 1846, he was made captain by brevet for gallant conduct in the defence of Fort Brown, and in June was made

captain of artillery. He was present at the battle of Monterey, Sept. 21-23, and was breveted as major for gallant conduct there; and in 1847 he was breveted as lieutenant colonel for gallant conduct in the battle of Buena Vista. From 1848 to 1855 he was engaged in frontier service at Jefferson Barracks, Mo., Fort Gibson, and Washita. In March, 1855, he was appointed major of cavalry, but declined, and received leave of absence. In January, 1856, he resigned his commission in the army, and retired to his plantation at Thibodeaux, La. In 1859-'61 he was commissioner of the board of public works of the state of Louisiana. When the civil war broke out, he joined the confederates, was appointed brigadier general, and placed in command at Pensacola. In February, 1862, he was made major general, and ordered to join the army of the Mississippi. He took part in the battle of Shiloh, April 6 and 7, was raised to the full rank of general in place of Gen. A. S. Johnston, killed at Shiloh, and after the evacuation of Corinth succeeded Gen. Beauregard in command of the department. In August he left Tennessee at the head of a strong force, and entered Kentucky, but after the battle of Perryville, Oct. 8, was forced to retreat, carrying with him a vast amount of supplies and many recruits from Kentucky. He was removed from his command and placed under arrest, but was soon restored, and resumed command of the force opposed to the federal army under Rosecrans. He was checked by Rosecrans in the protracted contest of Stone river or Murfreesboro, Dec. 26, 1862, to Jan. 2, 1863, again encountered and defeated him at Chickamauga, Sept. 19-20, 1863, but was decisively defeated by Gen. Grant at Chattanooga, Nov. 23-25. Shortly afterward he was relieved from command and called to Richmond, where for a time he acted as military adviser to President Davis, with whom he was a favorite. In the autumn of 1864 he led a small force from North Carolina to Georgia, to operate against Sherman, but without success.

BRAHAM, John, an English tenor singer, born of Jewish parents in London about 1774, died there, Feb. 17, 1856. He first appeared on the stage at the age of 12 years, and for more than half a century enjoyed a high reputation throughout Europe. In 1796 he appeared in opera at the Drury Lane theatre, after which he sang with the greatest success in Paris and the leading cities of Italy. Returning to England in 1801, he appeared in opera at Covent Garden and afterward at Drury Lane, where for more than 25 years he proved a strong attraction. In 1840 and 1841 he appeared in the United States and created great enthusiasm by his singing in operas, oratorios, and concerts. In 1841 he returned to England, and continued even to the age of 80 years to attract large audiences. He was noted for the purity of his voice and the brilliancy of his execution, and is said to have retained command of the

tenor scale longer than any other man ever known. Brahm also composed numerous songs which met with great popularity, and were noted for the beauty of their melody.—His son Aveverus acquired some distinction as a tenor singer. He first sang in opera in New York in 1852, having previously appeared in concerts.

BRAHE, Tycho or Tyge de, a Danish astronomer, of Swedish origin, born at Knudstorp, in Scania, which then belonged to Denmark, Dec. 4, 1546, died in Prague, Oct. 13, 1601. He came of an ancient princely family, the ruins of whose castle, Wisingsborg, are still visible on the shore of Lake Wetter. He was the second of ten children, and he as well as his youngest sister Sophia early displayed great intellectual ability. After having been under the care of private tutors, his maternal uncle, Steno Belle, sent him after the death of his father to Copenhagen to study philosophy, and in 1562 to Leipsic to study law; but astronomy engrossed his attention almost exclusively, the fulfilment of the prediction in regard to the eclipse of the sun in 1560 having essentially contributed to strengthen his faith in that science. His relatives insisting upon his preparing himself for the law and for statesmanship, he clandestinely devoted the night to astronomical observations, with the aid of a small celestial globe and a wooden circle for the measurement of the stars, thus observing in 1563 the junction of Saturn with Jupiter. The inheritance of a considerable fortune in 1565 left him at liberty to prosecute his experiments, in which he was encouraged by the Danish government in 1568. After spending some time in Augsburg, he returned to Copenhagen in 1570 with a European reputation, which was increased in 1572 by his discovery of a new star, though this did not reappear after 1574. His uncle gave him every opportunity for astronomical observations at his seat near Knudstorp; but his marriage with a peasant girl produced great unpleasantness with his relatives, though Frederick II. of Denmark endeavored to effect a reconciliation. At the king's request he lectured at Copenhagen in 1574 on the theory of comets and on mathematics, and he afterward visited Germany, Switzerland, and Italy. He resolved in 1576 to settle permanently in Basel; but the king secured his services by bestowing upon him for life the island of Hven in the Sound, and by building there for him a laboratory and a magnificent observatory, which was finished in 1580. It acquired great celebrity under the name of Uranienborg, and Brahe gave here such a powerful impetus to astronomical science, that distinguished personages of all countries visited him, including James VI. of Scotland, afterward James I. of England, while in Denmark to marry the princess Anne. Frederick II. spared no effort and no money to enlarge the scope of the astronomer's labors, and gave him a pension of 2,000 crowns and the canonry

of Roeskilde with a revenue of 1,000 crowns, besides other endowments. But soon after the king's death he lost all these advantages, owing to the hostility of Walchendorff and other members of the council of regency. Not only was he driven from Uranienborg on account of his inability to defray the expenses of the observatory, but he was also obliged to leave Copenhagen; and in 1597 he abandoned Denmark for ever. He went with his family to Rostock, and then to Holstein, where he prevailed upon Heinrich von Rantzau to recommend him to Rudolph II. of Germany. This emperor received him with great distinction, and assigned him in 1599 a pension of 3,000 florins in gold and a residence in his own château of Benach, near Prague, where Kepler visited him in 1600. Subsequently Brahe was installed by the emperor in an extensive mansion in Prague, which he proposed to convert into another Uranienborg, but he died too soon for the accomplishment of this purpose. He was interred in the *Theinkirche*, one of the principal churches of Prague, where a marble effigy perpetuates his memory. The emperor purchased his valuable collection of instruments, but, with the exception of one sextant, they have all been destroyed in times of war; and his famous celestial globe of brass, said to have cost 5,000 thalers, found its way back to Copenhagen after many vicissitudes, only to be burnt during the conflagration of the palace in 1720. Brahe was of a violent and hasty temper, and so superstitious that he kept about him a lunatic whose ravings he regarded as prophetic.—His system was not extensively adopted, and is considered as but a modified form of that of Ptolemy. But to Brahe belongs the merit of having been the first to lay the foundation of practical astronomy, and Kepler used his numerous and for his time wonderful observations effectively in his discoveries. Brahe's principal publications include *Calendarium Naturale Magicum* (1582), *Progymnasmata Astronomica* (2 vols., 1587-'9), *Astronomia instaurata Mechanica* (a description of his instruments, 1598), and *Epistola Astronomica* (1610). His observations were collected by his disciples in 1666 (*Historia Cælestis*, 20 vols.). His chief biographers are, in Italian, Gassendi (Paris, 1655); in German, Helfrecht (Hof, 1798); and in Danish, Pederesen (Copenhagen, 1838). See also Brewster, "Martyrs of Science" (London, 1841), and Bertrand, *Les fondateurs de l'astronomie moderne* (Paris, 1865).

BRAHMA, Brahman, Brahmanism (also **BRAHMIN, BRAHMINISM**), **Brahmana**. Of this, the most important body of words in the religious history of India, the starting point is the neuter noun *brâhman* (nom. and accus. *brâhma*), which is of frequent occurrence even in the oldest parts of the Veda, as signifying "worship, offering of devotion and praise." In later developments it is used to mean holy words, songs, action, &c., and finally the sacred principle, the highest

object of religious thought and veneration, the absolute and infinite. From it comes first the masculine noun *brahmān* (nom. *brahmā*), having a twofold use: 1, an offerer of worship, devotee, priest, and hence, more specifically, the supervising and correcting priest in the intricate Hindoo ceremonial; 2 (later, and by reflection from the later sense of *brāhman*), a kind of personal incorporation of the absolute, a theosophic highest divinity, the supreme god, Brahma. The secondary classes of Vedic writings are full of *brāhman* (neuter) as the theme of religious contemplation; but a god Brahma is much more recent, and a creature of sacerdotal philosophy. The Hindoo trinity (*trimūrti*), in which he figures as creator, beside Vishnu as preserver and Siva as destroyer, was a piece of artificial system-making, having no real root in the religious consciousness of the people. Brahma was never actually worshipped, nor had temples built to him. Our word brahman or brahmin represents the derivative adjective *brāhmaṇa*, which, as coming from *brāhman*, signifies "dealing with worship and sacred things," or, as in part also from *brahmān*, "of priestly descent and office." This adjective begins to appear in the more recent parts of the Veda; and with the rise of a priestly caste and a hierarchy in India, it becomes the name of that caste, the dominant class in a system of religious polity which is thence called Brahmanism, and of which the history constitutes an essential part of that of India. (See INDIA.) The neuter of the same adjective, *brāhmaṇam*, is used to denote a class of writings in the religious literature of India, next in age to the hymn texts of the Veda, and dealing with questions of religious and ceremonial theory, exegesis, and so on. There are several treatises bearing this title. (See VEDA.)

BRAHMAPOOTRA, or **Brahmapootra** ("offspring of Brahma"), one of the largest rivers of India, rises in Thibet at the E. extremity of the Himalaya mountains, between lat. 28° and 29° N., and lon. 97° and 98° E. Here the Taluka and Taluding unite and form the Lohit, which, after emerging from the mountain pass in a S. W. direction, assumes the name of Brahmapootra. Near Suddya, in about lat. 27° 50' N. and lon. 95° 30' E., it is joined by the Dihong and Dibong. The former has been traced through the Himalaya chain to lat. 28° 15' N. and lon. 95° 10' E., and is thought to be a continuation of the Dzang-bo-tzin or Sanpo, a large river which rises in Thibet N. of that range. After receiving these tributaries, the river flows 75 m. S. W. through Assam, and then diverges into the Boree Lohit and the Dihing. Uniting again after a divided course of 65 m., it flows W. through the district of Goalpara, winds around the W. extremity of the Garrow hills, separates Goalpara and Mymensing from Rungpoor, and, after sending off a branch called the Konaie, which joins it again further down, runs S. E. for 130 m. It then changes its name for that of Megna, re-

ceives part of the waters of the Ganges through the Kirtynassa, and after various windings enters the bay of Bengal by three channels: the Ganges on the W., the Shabazpoor in the centre, and the Hattia on the E. Its total length, from its source to the bay, is about 900 m.; but including the Dzang-bo-tzin, it is about 1,600 m. It is navigable from its mouth to the Dihong by the ordinary vessels of the country, and for some distance further by canoes. Through the last 60 m. of its course, it is from 4 to 5 m. wide, and studded with islands. Its waters are muddy; its banks are mostly covered with marshes and jungles, and are subject to annual inundations. During the season of the overflow, from the middle of June to the middle of September, the level districts of Assam are almost wholly submerged, so that travel is impossible, except on causeways 8 or 10 ft. high. The volume of water discharged by the river at such times is immense. Even in the dry season it is equal to 146,188 cubic feet a second, while under the same circumstances the Ganges discharges only about 80,000.

BRAHMS, Johannes, a German pianist and composer, born in Hamburg, March 7, 1838, where his father was a player on the double bass. He was placed at the age of 12 under the instruction of Edward Marxsen, and when 14 played at concerts the most difficult modern compositions as well as classical works of the older masters. He was first brought prominently into public notice by Robert Schumann, who in 1853, in his *Neue Zeitschrift für Musik*, predicted for Brahms a great career, speaking of the young composer as "one destined to give expression in an ideal manner to the deepest feelings of the age—one who will present us with the qualities of a master." Brahms has hardly filled the place that Schumann marked out for him, though his influence upon the musical art, so far as it has extended, has been exerted thriftily. He has resided generally in Vienna. His works consist of sonatas, songs, trios, and other compositions for stringed instruments, choruses, and orchestral works.

BRAIDWOOD, Thomas, one of the earliest teachers of the deaf and dumb in Great Britain, died in 1806. He commenced a school for deaf mutes at Edinburgh in 1760, following the system of Heinecke and others, giving great prominence to articulation and "reading from the lip." His processes were kept a close secret in his own family for many years. He taught with considerable success at Edinburgh till 1788, when he removed to Hackney, near London, continuing his school till his death, after which it was carried on by his widow and her grandchildren. The Braidwood family long had a monopoly in instructing the deaf and dumb in England. A pamphlet, entitled *Vox Oculis Subjecta*, published in 1783 by an American whose son had been educated there, gives an account of the school at Edinburgh.

BRAILA, Ibraila, or **Brahilov** (Turkish, *Ibrahil*), a town of Roumania, in Wallachia, on the

left bank of the Danube, 103 m. N. E. of Bucharest; pop. about 16,000. It is the chief port of Wallachia. The trade consists in the produce of the country, such as barley, wheat, maize, linseed, hides, tallow, timber, and tobacco. It is chiefly conducted by Greeks; but many English and other merchants are engaged in it. Braila suffered much by the Turkish wars in the 18th century, and was burned by the Russians in 1770. Afterward it was restored to the Turks, but surrendered to Russia in 1828. Since the subsequent treaty of peace of Adrianople, it has continued to form part of Wallachia.

BRAILLE, Louis, the inventor of a method of writing with points for the blind, born at Lagny, a suburb of Paris, in 1809, died in 1852. He lost his sight at the age of six years by an accident, and in 1819 was admitted to the institute for the blind at Paris. He devoted himself to the study of the piano, violoncello, and organ, and became one of the most distinguished organists of Paris. In 1827 he was appointed a professor in the royal institute, and soon after modified M. Charles Barbier's system of writing with points so as to render it practicable and convenient. This system was introduced into most of the continental schools for the blind. Braille also applied his system to musical notation.

BRAIN, a collective term, denoting those parts of the nervous system (excluding the nerves) which are contained in the cranial cavity, viz.: the brain, in its popular signification, or the cerebral hemispheres; the *cerebellum*, or little brain; and the *medulla oblongata*, or the upper part of the spinal cord. Each of these has its special part to play in the animal organism. The brain alone, of the animal tissues, is directly influenced by the mental acts of living beings, and through it are effected the mutual reactions of mind and body; the phenomena of sensation and volition, and the mysterious agency of intellect and instinct, are all manifested through the channels of the nervous centres, the most important of which is the brain. The peculiar substance through which all these actions take place exists in two forms, the vesicular and the fibrous. The vesicular nervous matter is gray or ash-colored, granular in texture, containing nucleated nerve vesicles, largely supplied with blood, and is the originator of nervous power; it is sometimes called the "cortical substance," from its forming a thin layer over the exterior of the brain; it is also found in the centre of the spinal cord. The fibrous nervous matter is generally white, firm, and inelastic, composed of tubular fibres; it is less vascular than the other, and constitutes nearly the whole of the nerves and the greater part of the spinal cord; it simply propagates the impressions sent to or from the vesicular matter. The two kinds do not occur together except in the nervous centres. In the vertebrated animals, nervous matter is a soft and delicate substance, owing the greater part of its tenacity to the

vascular and fibrous tissues connected with it. The chemical composition of nervous matter has been well ascertained by Fourcroy, Vauquelin, and Frémy; but the distinguishing characters of the gray and white substance are as yet imperfectly known. Fourcroy notices the great amount of water in the cerebral matter, from six eighths to seven eighths of its weight, upon which its softness is in great part dependent. According to Vauquelin's analysis in 1812, the brain is an emulsive mixture of albumen, fatty matter, and water holding in solution saline and other matter common to it with other tissues. The following table gives the result of his analysis:

Albumen	7.00
Cerebral fat { stearine, 4.56 }	5.23
{ elaine, 0.70 }	
Phosphorus	1.50
Osmazome	1.12
Acids, salts, sulphur	5.15
Water	80.00
	100.00

The medulla oblongata contains more cerebral fat, but less albumen, osmazome, and water. Frémy's analysis, published in the *Annales de Chimie*, 1841, confirmed that of Vauquelin, and showed the following proportions: 7 parts of albumen, 5 of fatty matter, and 80 of water. He extracted from the fatty matter the following secondary principles: 1, cerebrie acid, a white granular, crystalline substance, containing no sulphur, a little phosphorus, and 66 per cent. of carbon; 2, oleophosphoric acid, separated from the cerebrie by its solubility in ether, containing about 2 per cent. of phosphorus in the condition of phosphoric acid, and combined with elaine; 3, cholesterine, the same as that obtained from bile (brains preserved in alcohol are apt to be surrounded by a crystalline substance resembling cholesterine); 4, traces of elaine, margarine, and fatty acids. The brain is remarkable for containing phosphorus, which varies in quantity at different periods of life, being the least in infancy and old age; the maximum of water is found in infancy, an interesting fact in connection with the serous effusions so prevalent at this period of life; it has been ascertained that the idiot brain contains less phosphorus than the normal organ, this being diminished from nearly 2 to less than 1 per cent., indicating possibly an important hint for the treatment of diseases accompanied by deterioration of the mental powers. The microscopic elements of nervous tissue are fibres and cells. The fibrous nervous matter, or white central substance, contains tubular fibres or nerve tubes, and the gelatinous fibres found chiefly in the sympathetic system. The white fibres are membranous cylinders, of a pearly lustre, consisting of an external delicate, transparent sheath, within which is a layer of thick, fluid, highly refractive matter, called the "medullary layer;" while the central portion is occupied by a finely granular mass, termed the "axis cylinder." The medullary layer, how-

ever, is less distinct in the fibres of the brain than in those of the nervous trunks, and in some instances appears to be altogether wanting. The fibres of the brain average $\frac{1}{1000}$ of an

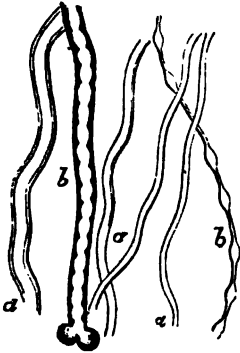


FIG. 1.—Nerve Fibres of the Brain.

inch in diameter, presenting at some points a swollen appearance; they do not communicate with each other like the vessels, nor divide into smaller fibres, but continue unbroken from their origin to their final distribution, inosculating only at their terminal loops. The gelatinous or gray fibres seem to be solid, flattened, transparent filaments, varying in diameter from $\frac{1}{1000}$ to $\frac{1}{100}$ of an inch; the mode of their connection with the elements of the nervous centres is unknown. The essential elements of the vesicular or gray nervous matter are cells, or vesicles, containing nuclei and nucleoli; they are dark, generally globular, but at times very irregular and variously elongated, enclosing a grayish granular substance, and sometimes pigment granules; they vary in size from $\frac{1}{1000}$ to $\frac{1}{10}$ of an inch in diameter; among the largest of these are the caudate, so called from the irregular tail-like process extending from them.

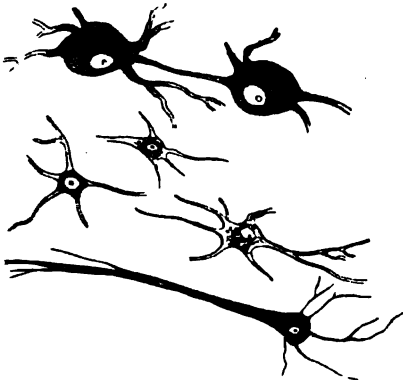


FIG. 2.—Nerve Cells of the Brain.

The nerve vesicles are imbedded in a soft granular matrix in the brain. The nervous centres exhibit the union of these two forms of matter, more widely separated in the brain than in the

smaller ganglia; indeed, the cerebral hemispheres are composed internally of fibrous matter exclusively, surrounded by a layer of the gray vesicular substance, into which the fibres are also prolonged. The tubular fibres seem to be capable of regeneration to a certain extent; if the nerve be divided, but the ends not separated, union may take place, and the nerve resume its office; even when a portion is excised, it appears that true nerve fibres, in smaller number than in the nerve itself, may be developed in the uniting substance, as shown by partial restoration of function and microscopic examination. When a portion of the brain is removed by accident or design, its place is supplied by new substance; but whether this be true cerebral substance or not has not been satisfactorily determined. The white fibres may be distinguished, according to their physiological office, into three kinds—efferent or motor, afferent or sensitive, and commissural or connecting. Henle suggests that there may be a fourth series, associated with the operations of thought. Of the mode in which the afferent nerves terminate, and the motor nerves commence in the central organs, it may be said that three principal modes have been ascertained, in which there is an actual continuity from one form of nerve tissue to the other: a globular unipolar cell may give out a single prolongation, which becomes a fibre; or a nerve cell may be found in the course of a tube, with each extremity prolonged into a fibre; or some of the radiating prolongations of the caudate cells may become continuous with the axis cylinders of nerve tubes, or inosculate with those of other caudate cells. A curious circumstance in connection with the gray matter is the large quantity of pigment or coloring substance in it, apparently forming one of its essential constituents, as it is everywhere present, though in some situations more abundantly than in others; it has been asserted that this bears a close resemblance to the coloring matter of the blood, and if so, it is a fact of great interest to physicians, who can avail themselves of the restorative properties of iron in cerebral diseases, improving the quality of the nutrient blood by increasing the quantity of the red globules.—The central column or spine of the vertebrate skeleton encloses in its canal the spinal cord; and the cranium, which is a series of modified and expanded vertebrae, protects the continuation of the cord and its expansion into an aggregate of gangliform swellings, the brain or encephalon. The brain is enclosed in three membranes, or *meninges*, continuous with those of the spinal cord, which will be described under that head. From without inward, these membranes are the *dura mater*, *arachnoid*, and *pia mater*. The *pia mater* ($\mu\pi\tau\mu\pi$, mother) originated with the Arabians, who considered these membranes as the parents of all others in the body. The *dura mater* is a membrane of white fibrous tissue, strong, flexible, but not elastic; its fibres are arranged on different

planes; it is freely supplied with blood vessels, and is perforated for the passage of nerves, and, according to Arnold and Pappenheim, has some branches between its own laminae. It forms the internal periosteum of the skull, and is closely applied to the cranial bones, and in some places firmly adherent, especially in youth and old age. From its processes are



FIG. 8.—The Brain enclosed in the Dura Mater.

given off, which serve as partitions between the cerebrum and cerebellum behind, and between the cerebral and cerebellar hemispheres; these processes are the *falx cerebri*, which separates the great hemispheres, extending on the median line from the forehead to the occiput, along the sagittal suture; it is falciform in shape, its lower border concave and corresponding to the convexity of the *corpus callosum*, and its upper border enclosing the great longitudinal sinus; narrow in front, and deep behind, having the inferior longitudinal sinus along its posterior border. The *tentorium cerebelli* extends horizontally between the posterior cerebral lobes and the cerebellum; it is attached to the falx cerebri, and to the occipital and petrous portion of the temporal bones along the groove for the lateral sinus; in the cats and some other leaping animals, this membrane is partially replaced by bone, doubtless to prevent injury from sudden shocks. Between the lobes of the cerebellum descends vertically from the tentorium the *falx cerebelli*, containing the occipital sinuses. Next to the dura mater, which also furnishes sheaths for the nerves and vessels at their origins, lies the *arachnoid*, the serous membrane of the cerebro-spinal cavity; it consists of two layers, the outer one closely adherent to the dura mater, and the inner one loosely to the pia mater; the space between the two layers is the arachnoid cavity, and that between it and the pia mater, the sub-arachnoid cavity; resembling other serous membranes, the arachnoid is liable to become inflamed, with the effusion of fluid into one or both of the above cavities, especially toward the base of the brain. The sub-arachnoid space is filled with what is called the "cerebro-spinal fluid," varying in quantity from two or three ounces in the healthy adult condition to ten or twelve ounces in old age. It keeps during life the opposed arachnoid surfaces in contact;

it is most abundant where the brain has shrunk either from disease or advanced age. From the experiments of Magendie it appears that its presence is necessary for the healthy action of the nervous centres; when removed, it is quickly formed again; it is a limpid, alkaline fluid, doubtless secreted by the pia mater, and affords mechanical protection to the brain and spinal cord by the interposition of its yielding medium between them and the bony parietes which surround them; its accumulation at the base of the brain is highly favorable for the protection of the large nerves and vessels there situated. This fluid exists in an increased quantity in the brains of idiots; and whenever the cranial or spinal walls are deficient, as for instance in *spina bifida*, an accumulation of the fluid becomes prominent at the part, thereby protecting the nervous substance. The third membrane immediately investing the brain is the *pia mater*, composed of white fibrous tissue and blood vessels; in the skull it is very delicate and very vascular; it adheres to the surface of the cerebral and cerebellar hemispheres, and sends innumerable minute vessels to their substance; it sinks into the fissures and sulci, and penetrates into the ventricles, forming the *choroid plexuses* and the *velum interpositum*; its minute ramifications are sometimes incrustated with sandy particles, consisting principally of phosphate of lime. The pia mater is the medium of nutrition to the nervous substance and to the arachnoid; and hence any inflammation of these membranes would be communicated to the superficial gray matter of the brain, the seat of its physiological activity. Along each side of the longitudinal sinus it is common to find a series of depressions in the dura mater; these are due to the presence of whitish granules, called Pacchionian glands, from their first describer, of an albuminous material, arising probably from a deposit of granular lymph among the vessels of the pia mater; they are found principally along the edge of the great longitudinal fissure of the hemispheres, pushing the arachnoid before them, and even projecting into the sinus. They are generally considered morbid structures, and the result of local irritation of a chronic character; if the products of disease, they do not seem to interfere in the least with the functions of the brain.—The brain of the adult human male, comprising the whole contents of the cranium as far as the occipital foramen, will average in weight about 50 oz.; that of the adult female, about 45 oz.; the maximum weight of the healthy organ is about 64 oz., and the minimum about 31 oz.; in cases of idiocy it has been found weighing only 20 oz. According to Bourguery, if the brain be divided into 204 parts, the cerebral hemispheres would weigh 170, the cerebellum 21, and the medulla and sensory ganglia 13; on the same scale, the spinal cord would weigh 7. In proportion to the body's weight, the brain of man would weigh $\frac{1}{4}$ part; in the average of mammalia this proportion would be $\frac{1}{14}$; in

birds, $\frac{1}{10}$; in reptiles, $\frac{1}{100}$; and in fishes, $\frac{1}{1000}$. In some apes, rodents, and singing birds the weight of the brain bears a higher proportion to that of the body than it does in man, even as high as $\frac{1}{5}$ in the blue-headed titmouse; the increase, however, is not in the cerebrum, the seat of intellect, but in the sensory ganglia, the seat of the instinctive actions. The size of the brain is not in proportion to the physical development of the body, either in animals or man; the horse has a brain inferior in weight to the smallest adult human brain; that of a whale 75 feet long was found to weigh not quite twice as much as that of a man. Even in men there is no fixed relation between the size of the body and of the brain; a small man may have a large brain, and *vice versa*. Men of great intellectual power have generally, if not always, possessed large brains; the brain of Cuvier, the great French naturalist, weighed between 59 and 60 oz.; that of the French surgeon Dupuytren, 58 oz.; those of Napoleon and Daniel Webster, an ounce or two less. The quality of the brain, however, is quite as important as the quantity, so that a large brain does not of necessity constitute a great man. According to Tiedemann, the female brain, though absolutely smaller than that of the male, is larger when compared with the size of the body. The brain reaches its highest development anatomically at the age of 20 years, which it maintains until 60, after which, in most persons, it begins to decrease in size, with a corresponding decline in the mental powers. There do not appear to be any striking differences between the brains of the various races of man.—For the topographical and pathological anatomy of the brain, an examination from the hemispheres downward is the most practicable method; but for physiological anatomy, it is more advantageous to make the examination from below upward, by which method the student proceeds from the simple to the more complex, following the direction of the fibres of the medulla oblongata to their ultimate distribution in other parts of the brain. The medulla oblongata is the upper enlarged portion and direct continuation of the spinal cord, extending from the plane of the occipital foramen about an inch upward to the *tuber annulare*; through this the brain is brought into communication with the other vital organs, and it is therefore the *navel vital*, "the link which binds us to life." As its size is proportionate to that of the nerves which proceed from it, it is much larger in some lower animals than in man. Like the spinal cord, it consists essentially of anterior and posterior columns; it may be anatomically distinguished from the cord by the decussation or crossing of some of the anterior fibres. In front are the "anterior pyramids," separated by a median fissure; external to these are the oval protuberances, the "olivary bodies;" more external, and forming the lateral and great part of the posterior portions, are the "restiform bodies," separated from each other in the mid-

dle by two slender columns, the "posterior pyramids." The anterior pyramids or fibres extend from the antero-lateral columns of the cord to the cerebral hemispheres, passing through the *tuber annulare*, the *corpora striata*, and the *optic thalami*, contributing to form the lower portion of the *crus cerebri*; in the *tuber annulare* these fibres are crossed at right angles by others belonging to it, and are interlaced with them; on tracing them downward, the greater part connect themselves with the middle or lateral columns of the opposite side, while a few are continued down on the same side into the anterior columns of the cord, and others, the "arciform fibres," curve round the olivary bodies and ascend to the cerebellum, not passing to the cord; the anterior pyramids are entirely of a fibrous structure. The arrangement of these fibres is highly interesting in explaining the phenomena of disease of the brain; since, owing to the decussation of the fibres in the medulla oblongata, an injury of the right side of the brain will produce paralysis on the left side of the body, and *vice versa*; while a lesion of one lateral half of the spinal cord, below the point of decussation, causes paralysis of the same side of the body. The restiform bodies consist of fibrous strands enclosing a gray nucleus, and pass upward into the *crura cerebelli*; below they are chiefly continuous with the posterior spinal columns, and partly with the posterior part of the middle columns; as the fibres ascend they diverge, leaving between them the fourth ventricle, and pass into the corresponding hemisphere of the cerebellum, connecting this latter with the spinal cord; the cerebellar columns also communicate by a band of arciform fibres, according to Solly, with the anterior spinal columns; the gray nucleus, or "restiform ganglion," seems to be the ganglionic centre of the pneumogastric and a part of the glossopharyngeal nerves. The posterior pyramids can hardly be distinguished from the restiform bodies externally; but their columns, bounded by the median fissure and by a very slight groove, establish a connection between the sensory tract of the *crura cerebri* and the posterior columns of the cord; their gray nuclei are the ganglionic centres of the auditory nerves. The olivary bodies, continuous inferiorly with the anterior or motor columns of the cord, and affording attachments to the motor fibres of the first and second cervical nerves, enclose a gray nucleus, and send their fibres forward to the motor tract of the *crus cerebri*, and backward to the quadrigeminal bodies; the nucleus, or *corpus dentatum*, seems to be connected with the hypoglossal or motor nerve of the tongue, and also with the glossopharyngeal, one of the sensory nerves of this organ. The medulla is not only a transmitter of fibres from the spinal cord, but is a nervous centre itself; with it are connected the nerves of respiration and deglutition, which are quite independent of the cerebral hemispheres, and beyond the control

of the will.—The cerebellum, one eighth of the size of the cerebrum, is placed under the posterior part of the latter, from which it is separated by the *tentorium*; it is composed of white and gray matter, the former occupying the interior; its convolutions have the form of parallel layers. Its central part or lobe is the only one found in fishes and reptiles; its lateral lobes, found only in the higher animals and in man, indicate an advance in development. On a vertical section we find the white substance resembling the trunk of a tree from which branches are given off, hence called *arbor vitæ*, or tree of life. This organ is connected with the rest of the brain by three sets of fibres, the superior extending to the *tubercula quadrigemina*, the middle or the restiform fibres passing downward to the medulla, and the inferior or transverse (*pons Varolii*) passing to the opposite side and forming a considerable part of the tuber annulare; the central lobe has aggregates of lobules on its superior surface,



FIG. 4.—Profile view of Human Brain, in vertical section, showing the medulla oblongata, the tuber annulare, the middle portion of the cerebellum with the arbor vitæ, the central parts of the cerebrum, and the convolutions on the inner surface of the hemispheres.

containing both white and gray matter, the "superior vermiform processes," and on the lower surface the "inferior vermiform processes." The transverse diameter of the cerebellum is $3\frac{1}{2}$ to 4 inches, the length 2 to $2\frac{1}{2}$ inches, and its thickness varying from 2 inches in front to less than $\frac{1}{2}$ inch behind. For details on the structure and on the intricate divisions of the cerebellum, the reader is referred to special works mentioned at the end of this article. Disease of the cerebellum, when deep-seated, is generally manifested on the opposite side of the body; this organ presides principally over the regulation of the voluntary movements. The restiform bodies of the medulla in their ascent to the hemispheres of the cerebellum diverge, leaving a lozenge-shaped cavity, the fourth ventricle, bounded above by the median cerebellar lobe, below by the olivary columns, behind by the nodule of the inferior vermiform process, in front by a portion of the superior vermiform process, called the "valve of Vieussens;" on

the floor are the white barb-like fibres of the seventh pair of nerves, passing at right angles, and called the *calamus scriptorius*; it is improperly called the ventricle of the cerebellum, as it belongs to the medulla and is proportionate to it in size. The *mesocephalon*, or *tuber annulare*, embraces those portions of the brain which unite the cerebrum above, the cerebellum behind, and the medulla below; the lower surface, or the pons Varolii, consists of curved transverse fibres, passing from one crus cerebelli to the other, crossing apparently over the anterior pyramids like a bridge; they are always developed in proportion to the cerebellar hemispheres, and are absent in animals having only the median lobe; they constitute the great transverse commissure of the cerebellum, as the *corpus callosum* (mentioned hereafter) constitutes the great transverse commissure of the cerebrum; these fibres extend more than one half of the depth of the tuber annulare. The tuber annulare, which exists in animals whose cerebellum has no hemispheres, projects from the medulla proper, and contains a nucleus of gray matter; Longet is of opinion that this ganglion is an independent centre of sensation and motor power, and Dr. Todd states that the convulsions excited by a current of electro-magnetism through it are not tetanic, but epileptic, or alternating with relaxations of the muscles. Situated above the tuber annulare are the quadrigeminal bodies, the two anterior being called *nates*, and the two posterior *testes*; they are gangliform bodies, containing gray and white matter, the anterior being the larger; these are the analogues of the optic lobes of birds, reptiles, and fishes, in which classes there is only a single pair, but of much larger size. The crura cerebelli, which apparently emerge from the posterior angles of the tuber annulare, derive their fibres from strands going to the testes, from those of the restiform body, and from those of the pons Varolii; from the anterior angles of the tuber annulare diverge two similar processes of considerable thickness, the crura cerebri, which enter the cerebral hemispheres, and upon which each of these masses has been said by Dr. Todd to rest as a "mushroom upon its stalk." The fourth and fifth pairs of nerves are intimately connected with the tuber annulare. On making a section of the crura cerebri, three planes of nervous matter may be seen: the lower one, of fibrous matter, continuous with the tuber annulare and the anterior pyramids, passes up into the *corpora striata*, or striated bodies; above this is a dark mass, the *locus niger*, containing large caudate vesicles abounding in pigment, with nerve fibres among them; the upper layer, of grayish matter, continuous with the central part of the medulla oblongata, or olivary columns, passes up into the optic thalami. The striated bodies and optic thalami are best seen by laying open the lateral ventricles, in which they are placed, closely united to each other, the former being a little in front and outside of the latter. The striated bodies are

pear-shaped, tapering gradually backward in a long process which winds down into the anterior extremity of the descending horn of the ventricle, and striated when cut in an oblique

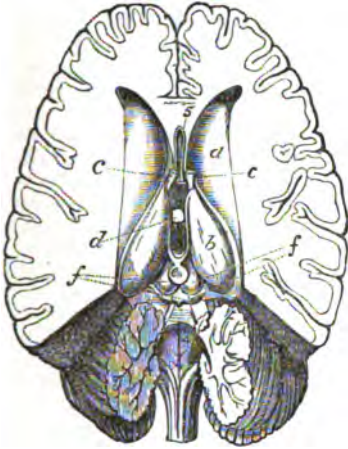


FIG. 5.—Human Brain cut open horizontally, to show its internal parts. *a*. Corpus striatum of the right side. *b*. Optic thalamus of the right side. Both these bodies are seen on the floor of the lateral ventricle, which is represented as cut open. *c*. Anterior pillars of the fornix, cut off at the level of the corpus striatum. *d*. The middle transverse commissure, passing across from side to side, between the two optic thalami. *e*. The pineal body. *f, f*. The tubercula quadrigemina. *4*. The fourth ventricle, situated just above the medulla oblongata. *5*. The fifth ventricle, situated in the substance of the septum lucidum.

direction upward and outward, on account of the passage of the fibres of the crura cerebri into the vesicular matter; through these bodies, by three sets of fibres, communications are established between the tuber annulare, medulla oblongata, and cerebral convolutions; they are generally considered the more essential part of the nervous system which controls voluntary movements. The optic thalami are of a lighter color, of the same texture and appearance as the olivary columns, of which they are the continuations; a portion projects into the ventricles, and the rest adheres to the striated bodies, the hemispheres, olivary columns, and quadrigeminal tubercles; the fibres no doubt are continuous with those of the white substance of the hemispheres, and with those of the striated bodies; between them is the third ventricle, the roof of which is formed by the *velum interpositum*, a process of the pia mater. The *corpora geniculata*, *externum* and *internum*, are small gangliform masses, projecting from the posterior part of the optic thalami. Behind the third ventricle is a conical, dark gray body, enclosed by a process of the pia mater, the "pineal body;" it rests in a groove between the nates, and is connected with the thalami by fibres, called peduncles; it consists chiefly of large nucleated vesicles, with a few fibres, and in a cavity near the base contains a sandy substance composed of phosphate and carbonate of lime; its use in the economy is unknown. The optic thalami

have been considered but the principal sensitive centres, without which the sensorium could not perceive the physical change resulting from a sensitive impression; but this is by no means certain.—The cerebral hemispheres constitute the great mass of the brain, and their horizontal section presents an oval, of which the smaller extremity is directly forward; the external surface is smooth, being covered by the arachnoid membrane; they are divided longitudinally along the middle line by the deep fissure which receives the falx cerebri, and at the bottom of which in the middle portion is the great commissure, the *corpus callosum*; the inferior surface, or base of the brain, is divided into anterior, middle, and posterior lobes, corresponding with the *fossae* in the cranial bones; the anterior lobe rests chiefly on the roof of the orbita, and on its inferior surface presents the nerve of smell; between it and the middle lobe is the "fissure of Sylvius," through which runs the middle artery of the brain; the middle lobes are gradually lost in the posterior, which are separated from the cerebellum by the tentorium. The space between the middle lobes in the centre is occupied by the pituitary body, crossing of the optic nerves, and the mammillary bodies. The pituitary body is lodged in the *sella turcica* of the sphenoid bone, and is a glandiform mass, surrounded by the coronary sinus, and connected with the brain by the infundibular process; it has two lobes, and somewhat resembles the vesicular substance of the brain; its use is unknown. Between the crura of the cerebrum the third pair of nerves emerge. The usual way of examining the hemispheres is to make a horizontal section at about one third from the summit; this section, denominated the *centrum ovale majus*, presents a centre of white substance, surrounded by a narrow border of gray, showing the zigzag outlines of the convolu-



FIG. 6.—Cerebral Hemispheres, viewed from above.

tions, and spotted by numerous small red points caused by the escape of blood from the cut ends of minute vessels. In the central line is a broad band of white substance, uniting the hemi-

spheres together as their great commissure, and securing their connected action, the fibres passing from one to the other like a bridge; at its anterior and posterior extremity it is folded downward toward the base of the brain. On cutting a little deeper, an irregular cavity is opened on each side, the lateral ventricle, containing the striated and optic bodies; these cavities are lined by a serous membrane, secreting a fluid, the undue accumulation of which constitutes *hydrocephalus internus*, or water on the brain, a fatal disease of children, in which the substance of the brain may become almost obliterated, and the bones of the yet ununited skull distended almost to the size of an adult head. The fifth ventricle is the space between the layers of the *septum lucidum*, an extension of fibrous matter connecting the anterior reflection of the corpus callosum with the horizontal fibrous stratum called the *fornix*, and separating the anterior horns of the lateral ventricles. Between the optic thalami and striated bodies in the ventricles, in a superficial groove, is the *tænia semicircularis*, a delicate band of fibrous matter, commissural in its character. The posterior horn of the lateral ventricle, according to Owen, is peculiar to man, as also is the *hippocampus minor*, a projection of one of the convolutions into it; in its inferior horn is the *hippocampus major*, and a considerable portion of the vascular choroid plexus. The cerebral hemispheres, after the membranes have been removed, present a peculiar folded arrangement of their surface, the

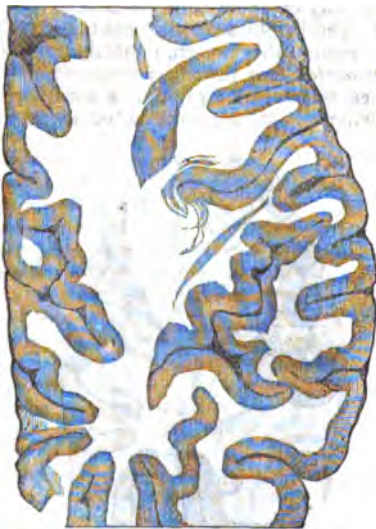


FIG. 7.—Portion of Right Hemisphere of the Human Brain, divided horizontally, showing the convolutions, and arrangement of white and gray matter.

"convolutions;" the folds consist of a layer of gray matter, varying from one eighth to one quarter of an inch in thickness. Physiology has shown that the gray matter of the

nervous centres is the originator of nervous force, while the white matter serves only to convey impressions to or from the different parts of the body; hence the greater the number of these convolutions, or, in other words, the greater the amount of the gray substance, the greater will be the physiological power of the brain. In the rat and the mole the surface of the brain is quite smooth; from these the convolutions increase in number up to man. Their arrangement, though never the same in two brains, nor on opposite sides of the same brain, cannot be supposed to be purely accidental; there are certain ones always present (when any exist), whose situation and size influence the disposition of the others; in man the variable and additional convolutions are chiefly on the top and front of the hemispheres. The lower the position of an animal in the scale, and the less developed the organ as we approach infancy, the greater is the symmetry of the two sides. It is said that the convolutions in the inferior races of man (Todd and Bowman) present a more symmetrical arrangement than is usually found in the more cultivated races. If the gray matter of the cerebral convolutions and the cerebellar layers were spread out, it would occupy about 670 square inches, which by this admirable arrangement are packed into the small extent of the brain. Each convolution consists of a fold of gray matter enclosing a process of the white; the gray matter forms a continuous unbroken sheet over the cerebral surface; the greater part of the white fibres emerge from the gray matter, and thence converge to the central parts of the brain. The fibres which unite different portions of the same or of opposite hemispheres are called "commissures;" the transverse are the corpus callosum, the anterior, posterior, and soft commissures; the longitudinal are the *fornix* and the superior longitudinal commissure. The corpus callosum connects the great bulk of the hemispheres, especially at the lower part; it is wanting in fishes, reptiles, birds, and the lower mammals. The anterior commissure particularly unites the striated bodies, many of its fibres passing through them and radiating to the middle cerebral lobes; it is very large in the marsupials, which have no corpus callosum. The posterior commissure connects the optic thalami, and is connected with the pineal body. The soft commissure also passes from one optic thalamus to the other, dividing the third ventricle into an upper and lower portion; unlike the other commissures, it contains gray matter. The superior longitudinal commissure is enclosed in the convolution overhanging the corpus callosum, and connects the anterior and middle lobes with the posterior. The *fornix* or vault is the most remarkable, extensive, and complicated of all the commissures; it is situated immediately under the corpus callosum, with which it is closely connected posteriorly; it may be divided along the median line into two

portions, one belonging to each hemisphere. Of this complicated structure it can only be said here that it begins at the optic thalamus, proceeding anteriorly to the base of the brain, where it turns suddenly upward and forward, thus forming the *corpora albicantia* or *mammillaria*, and, ascending toward the corpus callosum, passes along its lower surface, spreading laterally into what is called its "body;" it again descends at the back part of the brain, some of its fibres going to the posterior lobes, and others crossing the hippocampi to be connected with the middle lobes; it thus connects those parts of the convolutions of one side beneath the corpus callosum. Other probably commissural structures are the *pons Varii*, in the angle formed by the divergence of the crura cerebri, and probably connecting their fibres; the innermost fibres of the optic tracts are evidently commissural, connecting the quadrigeminal and geniculate bodies of opposite sides; the *tuber cinereum* is a layer of gray matter, containing many nerve tubes, extending from the mammillary bodies to the posterior curves of the corpus callosum, and forming intimate connections with the fornix, optic tracts and thalami, and the pituitary body. The fibres connecting the cerebrum with the cerebellum are very few; the principal, if not the only ones, are those going to the testes from the cerebellum.—An organ of such importance as the brain must require a large supply of blood; this is afforded by the great carotid arteries, coming directly from the aorta, and the vertebral branches of the subclavians, which meet at the base of the organ, freely communicating with each other. These arteries, coming so directly from the aortic arch, are prevented from injuring the delicate brain: 1, by the blood ascending against gravity; 2, by the curving of the vessels like the letter S before they enter the cranium, thus scattering the force of the stream in different directions; 3, by the minute subdivision of the vessels before they enter the cerebral substance. The impure blood returns through the jugular veins; hence any compression of these vessels by a tight neck stock, or the like, impedes the whole cerebral circulation, causing, it may be, dangerous congestions. If the blood could be shut off completely from the brain, death would instantly ensue; and to prevent the possibility of this accident, the vertebral arteries are protected by the bony canals of the cervical transverse vertebral processes from all danger of compression or ordinary injuries. The brains of persons who have died by hanging always exhibit great venous congestion. The veins of the dura mater are quite remarkable by pouring their contents into the large canals enclosed between its layers, the sinuses; these, unlike ordinary veins, cannot be distended beyond a certain point, and, as they all empty their blood into the internal jugular vein, any obstruction in this or in the superior vena cava very speedily produces an uncomfortable dis-

tention in the head. These sinuses are the superior longitudinal, corresponding to the superior margin of the falx cerebri, commencing near the root of the nose (*crista galli*) and terminating in the cavity called *torcular Herophili*, near the internal occipital protuberance; the inferior longitudinal sinus runs along the lower border of the falx, and ends in the straight sinus, which runs in the median line at the meeting of the falx and the tentorium, and opens into the torcular; the lateral sinuses extend from the torcular downward, and forward to the jugular veins. This is the largest sinus, and its canal is deeply hollowed out of the occipital and temporal bones; that of the right side is generally the larger. The sinuses are sometimes the seat of dangerous inflammation. Between the layers of the falx cerebelli are the occipital sinuses, opening into the torcular; the petrosal sinuses, running along the petrous portion of the temporal bone, open into the lateral sinuses; the cavernous sinuses are on each side of the sella turcica, communicating with the petrosal by the transverse sinus, and with each other by the circular sinus. From this arrangement of the sinuses, communicating freely with the external vessels, may be understood the signal advantages of local depletion in relieving vascular fulness within the head, and also the utility of cold applications for similar purposes.—There are 12 pairs of nerves belonging strictly to the brain, which differ from spinal nerves only in their distribution and in coming through openings in the skull instead of between the vertebrae; all, except the first, proceed from the spinal cord itself, or from its prolongation in the brain (the medulla oblongata). These nerves are: 1, the olfactory, or nerve of smell; 2, the optic, or nerve of vision; 3, *motores oculorum*, the motor nerves of all the muscles of the orbit, except the superior oblique and the external rectus; 4, the *patheticus*; 5, the trifacial or *trigeminus*, the general sensory nerve of the head and face; 6, the *abducentes oculorum*; 7, the facial, the motor nerve of the face; 8, the auditory, or nerve of hearing; 9, the glossopharyngeal, supplying part of the sensory fibres of the tongue, and presiding over the movements of swallowing; 10, the pneumogastric, or *vagus*; 11, the spinal accessory (the last two combined presiding over the functions of respiration and phonation); and 12, the hypoglossal, the motor nerve of the tongue. Philosophical anatomists have combined these nerves in various ways, separating the three nerves of special sense, and classifying the others in groups resembling spinal nerves, with their anterior motor, and their posterior sensitive roots. As the skull may be considered as composed of three cranial vertebrae, we have the olfactory, optic, and auditory special nerves, making their way out through the three vertebrae which may be called by the same name, corresponding to the three primary vesicles which are developed into the brain. Of the intervertebral, analogous to spinal nerves, the

first group is composed of the fifth pair for its sensory portion, and of the third, fourth, and sixth for its motor portion; secondly, we have the facial and glossopharyngeal nerves com-

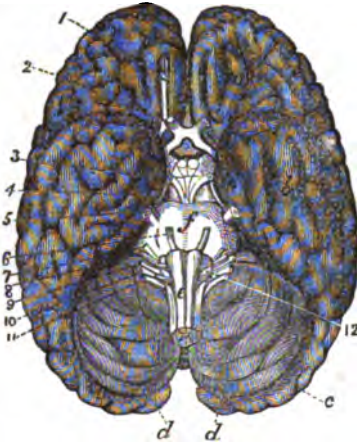


FIG. 8.—Human Brain, viewed from below. *a*. Anterior lobe of cerebrum. *b*. Middle lobe of cerebrum. *c*. Posterior lobe of cerebrum. *d*. Cerebellum. *e*. Medulla oblongata. *f*. Tuber annulare. 1. Olfactory nerves. 2. Optic nerves. 3. Trochlear nerves. 4. Trigeminal. 5. Facial. 6. Vestibulocochlear. 7. Glossopharyngeal. 8. Vagus. 9. Accessory. 10. Hypoglossal. 11. Spinal accessory. 12. Hypoglossal.

bined; and lastly, the par vagum and spinal accessory form the third group; the hypoglossal may be considered as the first of the true spinal nerves. For further details on this subject the reader is referred to the works of Carus, Oken, Owen, and other writers on philosophical anatomy. The nature of the nervous force, the functions of the nerves, and the general physiology and pathology of the subject, will be treated under NERVOUS SYSTEM; only a brief summary can be given here. Without question the various operations of the mind are associated with the cerebral convolutions; perception, memory, the power of abstraction, imagination, &c., possess, as instruments of action, the folds of gray matter; as Cuvier says, these parts are the sole receptacles in which the various sensations may be as it were consummated, and become perceptible to the animal. Mechanical injury to the convolutions and the central white substance occasions no pain nor disturbance of the motive powers; in many diseases of the brain and its membranes convulsions accompanied by pain occur, but this depends on a change produced in the striated and optic bodies, and through them propagated to the motor and sensitive nerves. On removing the hemispheres animals are thrown into a state of deep sleep, retaining their muscular power, yet apparently incapable of a single mental nervous action, voluntary or sensory. When the membranes are inflamed, especially the pia mater, the mental faculties are always disturbed; in the delirium of fevers, in delirium tremens, &c.,

the circulation of the convolutions seems to be disturbed. The convolutions, then, are the centre of the intellectual actions; being connected with the striated and optic bodies (which have been regarded as the centres of volition and sensation), the intellectual centre may either excite or be excited by them. When the convolutions are insufficiently supplied with blood, the deficient nutrition occasions deranged phenomena of thought and a rapid development of ideas, which, being ill or not at all regulated by the will, assume the forms of delirium and insanity, just as disease of the nerves of vision and hearing may produce unnatural sights and sounds. As in every muscular action some portion of the muscular tissue is wasted, to be supplied by the general nutrition of the body, so every thought is doubtless accompanied by some change in the nervous centre. Concussion of the brain from a fall or blow, or condensation of its substance by a clot of blood, checks the organic changes of the surface, and interrupts the joint actions necessary for consciousness. Gall, the founder of phrenology, assigned to certain convolutions certain faculties of the mind, moral feelings, and instinctive propensities. This theory has since his time been pursued with the zeal which must naturally attach itself to any science which professes to read the mental tendencies from external signs. In regard to phrenology, it can only be remarked here that, while it is undoubtedly true that the energy of a nervous centre bears a certain relation to its size, the stress laid by its followers on the temperaments shows that they consider the quality of the brain an important element in the development of nervous power.—During sleep the nervous centres obtain the rest necessary to repair the waste of daily activity; in this state the brain refuses or is slow to convey impressions from without. In deep sleep we are unconscious, and may be motionless; as the sleep becomes lighter, consciousness begins to return, and mental changes take place, constituting dreams of various kinds. Man performs many actions instinctively, without the intentional adaptation of means to ends, just as the bee makes its cell, or the bird its nest; children are born and live for some time without cerebral hemispheres, who perform the acts of sucking and swallowing perfectly well; remove the hemispheres in an animal, and it will eat if food be placed in the mouth, though it will not go to seek it; many idiots will do the same. In what part of the brain resides the power presiding over these actions? At the base of the brain, concealed by the hemispheres, is a series of ganglia, the origin of the nerves of special sense, as well as the striated and optic bodies into which all the fibres connecting the hemispheres with the medulla oblongata pass; these nerves have therefore their own nervous centres, distinct in function from other parts of the brain. In fishes these ganglia are very large, and the hemispheres comparatively small, sometimes smaller than a single pair, the

optic. In man the instinctive propensities are in a measure superseded by intelligence, but they may act independently of it. The real nervous centres for motion and sensation are those situated at the base of the brain, and not the hemispheres; as far as mere animal life and motion are concerned, the latter are not essential; a vast proportion of animated creatures (all the invertebrata) have no trace of them; they are added in man for the intellectual and moral nature. The instinctive and emotional actions are excited through the special ganglia, following directly upon sensation, without any process of thought; they are sometimes stronger than the voluntary actions; *e. g.*, we are often compelled to laugh at something ludicrous though we have the strongest motives not to do so. Long-continued habit will often make us perform actions instinctively, as it were, which at first required an effort of the will: for instance, in an old snuff-taker, who had been seized with epilepsy, irritation of the nose with a feather to restore consciousness produced a contraction of the right forefinger and thumb to take a pinch. These emotional actions may be excited by mental operations. Whenever the feelings get the better of the reason, the sensory ganglia are excited at the expense of the hemispheres, and the individual is for the time being morally insane, even though these emotions may point in the right direction; fanatics of all classes, in this way, are really insane, generally monomaniacs. These instincts may also be in opposition to the reason, and then the more a man follows them the closer does he approach the brutes. Comparative anatomy teaches that the cerebellum is largest in those animals which have the greatest variety of motions; injury or removal of this organ causes no pain nor convulsions, but destroys the power of combining properly the voluntary motions. Man, though inferior to many animals in particular kinds of movements, far surpasses them in the number and complexity of their combinations; the act of walking brings into action almost every muscle of the trunk and extremities, and is superior to all other modes of exercise. In man the cerebellum attains its highest development. Inflammation of its membranes, and even its almost complete destruction by slow disease, has little effect on the intelligence, but the motive powers are disturbed. In intoxication the energy of the cerebellum is first destroyed, and afterward the intelligence and consciousness, leaving the subject for the time little better than dead, motionless, and insensible. The distinct operation of these various centres is made obvious by many conditions of the body, in which one or more are inactive. In deep sleep, the hemispheres, the sensory ganglia, and the cerebellum are more or less completely at rest, but the medulla oblongata and the spinal cord must, as always, be wide awake; in dreaming, the hemispheres are partially active; in somnambulism, a step nearer to wakefulness, the hemispheres are awake, and

also the cerebellum, so that the movements are well adapted to the thoughts. It is well known that in this state persons have walked over dangerous places which they could never have passed in open day; there is an evident loss of control over the thoughts, which are more influenced by external impressions than in dreaming, so that the somnambulist may answer questions properly; that there is not full command over the senses, the dangerous accidents occurring in this condition fully prove; the events of this state may not be remembered in the waking hours, but may be taken up again by the memory the next night, constituting complete "double consciousness." A condition remarkably analogous to somnambulism is the mesmeric sleep or trance; a nervous habit of body predisposes to both. Overworking the brain exhausts the body; wear and tear of the brain, like wear and tear of the muscles, require periodic and long intervals of rest; from want of attention to this fact, many a bright intellect has faded into imbecility and insanity.—The primary ganglia of the vertebrate brain are three in number, and they are developed into the anterior or cerebrum, the posterior or cerebellum, and the median or quadrigeminal bodies. In fishes, the lowest vertebrates, the medulla is large, with the pyramidal and restiform bodies, but without the olivary; the brain looks like a series of ganglia developed on the superior surface of the cord, two pairs and a single one: 1, the olfactory lobes, analogous to the hemispheres in man, from which the nerves of smell arise; 2, behind these, the optic lobes, generally considered analogous to the tubercula quadrigemina, in some fishes larger than the other parts of the brain; from these arise the optic nerves, and the third, fourth, and sixth pairs; 3, behind these, the imperfectly developed cerebellum generally, but of large size in the selachians. In reptiles the brain well fills the cranial cavity, and the preponderance of the spinal cord is less; the olfactory lobes, now obviously the hemispheres, are increased in size, with an internal cavity, and a commissure; the second cerebral mass and its cavities are smaller; the cerebellum is small in the lower orders, but with lateral appendages and external striæ in the higher. In birds the brain and spinal cord are no longer on the same plane; the brain is the larger, and the ganglia are more above and less behind each other; the hemispheres are larger than the other parts, are united by commissures, and contain true lateral ventricles in which is a tubercle resembling a corpus striatum; the optic lobes are small, separated, with smaller cavities; the cerebellum is particularly large, with evident lateral lobes and external striæ. In mammals the brain is much larger than the cord; the cerebral hemispheres are of large size, with marked convolutions in the higher orders, with a corpus callosum, lateral ventricles with anterior, descending, and (in the monkey) posterior horns, optic and

striated bodies, *tesnie semicircularis*, and *for-nix*; the optic lobes are small, divided into two pairs, solid, and are now called the *tubercula quadrigemina*; the cerebellum is highly developed, the more so as the animal approaches man, presenting the *arbor vitæ* in its interior; the *pons Varolii* is large, and the fourth ventricle is completely concealed and shut in. Prof. Owen has divided the mammalia into four groups, according to the characters of the surfaces of the cerebral hemispheres; in some the hemispheres are but feebly connected by the fornix and anterior commissure, while in the great majority the corpus callosum is added; in the former case there is a peculiar mode of development of the young owing to the absence of the placenta. His groups are as follows: 1, *lyencephala*, having the hemispheres loose and disconnected, leaving exposed the olfactory ganglia, cerebellum, and more or less of the optic lobes, their surface smooth, or with very few anfractuosit-ies; this includes the marsupials; 2, *lissencephala*, having a corpus callosum, with the cerebellum and olfactory lobes exposed, the surface smooth, or with very few and simple convolu-tions; this includes the rodents, insectivora, cheiroptera, and edentata; 3, *gyrencephala*, having the cerebrum extending over more or less of the cerebellum and of the olfactory lobes, with more or less numerous convolu-tions; this includes cetacea, pachydermata, herbivora, carnivora, and quadrumana; 4, *archencephala*, embracing man only.—Those wishing to pursue the study of the brain are referred to the works of Solly, Longet, Leuret, Todd and Bowman, Carpenter, Owen, Tiedemann, Müller, and to the researches of J. Lockhart Clarke on the "Intimate Structure of the Brain; Human and Comparative," and those of Dr. John Dean "On the Gray Substance of the Medulla Oblongata and Trapezium."

BRAIN, Diseases of the. The diseases of the brain are considered as embracing, in addition to the affections seated in the cerebral sub-stance, or brain proper, those of the investing membranes or the meninges. The meningeal affections, that is, affections seated in the mem-branes, generally give rise to more or less dis-turbance of the functions of the brain, and not infrequently the disease extends from the men-inges to the cerebral substance. So, also, affections seated primarily in the brain proper often involve secondarily the investing mem-branes. Again, there are some diseases in which the cerebral substance and the meninges are simultaneously affected. Considering the diseases of the brain in this comprehensive sense, a convenient classification of them is the following: 1, cerebral congestion; 2, cerebral anæmia; 3, cerebral hæmorrhage; 4, inflam-matory affections; 5, structural lesions; 6, func-tional disorders. I. **CEREBRAL CONGESTION.** Here, as in other parts of the body, the name congestion denotes an overplus of blood (hy-peræmia), which is the result, on the one hand,

of an undue detention of blood, the quantity sent to the part being not necessarily greater, and perhaps even less than in health, or, on the other hand, of an undue supply of blood. An overplus of blood from detention is dis-tinguished as passive congestion, and the term active congestion denotes an undue determina-tion or supply of blood. In passive congestion the morbid accumulation is chiefly in the re-turning vessels or veins; in active congestion, the excess of blood is in the distributing ves-sels or arteries. In either form of congestion, the vessels of both the brain substance and the meninges are abnormally filled with blood. Active congestion of the brain may be caused by undue excitation of the emotional facul-ties of the mind. When this is the cause, the ex-cessive functional activity of the brain attracts to the head an undue quantity of arterial blood. Another cause is the abuse of alcoholic stimu-lants. Here, too, the exciting effect of alcohol upon the brain occasions a morbid afflux to the head. An increase of the muscular walls of the left ventricle of the heart is another cause of active congestion. This is apt to be a cause when the morbid muscular growth (hypertro-phy) is not compensated for by certain valvular lesions which obviate this effect. The active congestion under these circumstances is due to the blood being sent to the head in larger quantity and with greater force than in health. Active congestion of the brain, as regards its degree, varies from an amount which consti-tutes only a slight malady to an excessive de-termination of blood leading rapidly, or even suddenly, to death. Existing in a slight or moderate degree, it gives rise to diffused pain in the head, flushing of the face, and deficient or disturbed sleep. In a more marked degree, the headache is intense and accompanied with a sense of bursting, weight, or fulness; the sur-face of the head is hot; the face is deeply red-dened; the vessels of the eyes are injected; the arteries of the temple and neck pulsate strongly, and there is inability to sleep. Ac-tive or maniacal delirium is sometimes due to active congestion. Epileptiform convulsions are also, in some cases, attributed to this con-dition. A suddenly induced active congestion is among the different conditions giving rise to an apoplectic seizure which may prove speedily fatal. Apoplexy thus induced is distinguished as congestive apoplexy. The congestion may lead gradually to loss of consciousness, or coma, which may end in death. In some of the cases of insolation, or sunstroke, the only pathologi-cal condition found after death is cerebral con-gestion.—Active congestion of the brain may be diminished and often removed by appro-priate treatment. If dependent on mental ex-citement or the abuse of alcohol, the continued operation of these causes is of course, if pos-sible, to be prevented. In the rare cases of simple hypertrophy of the heart, that is, hy-pertrophy without valvular lesions, the abnor-mal power of the heart's action can be dimin-

ished by the regulation of diet and sedative remedies. In all cases, while the body should be well nourished, it is desirable to prevent or remove, by dietetic and other measures, that morbid condition of the blood known as plethora. Within the past few years a class of remedies—the bromides of potassium, ammonium, sodium, and calcium—have been introduced, which appear to diminish, by an effect upon the vessels, the amount of blood within the head. These remedies, at all events, have been found by experience to be useful in cases of cerebral congestion. In severe cases, characterized by active delirium or apoplectic coma, bloodletting will not only produce speedy relief, but, timely resorted to, it may rescue from impending death. If the symptoms and danger do not call for this potent measure, an active cathartic, especially croton oil, is promptly effective. Ligatures applied to the extremities may sometimes be substituted for bleeding. Cold applied to the head, in the form of either the douche or ice cap, is highly useful, and with these may be conjoined warm and stimulating applications to the extremities. Passive congestion, that is, an overplus of venous blood within the skull, is an effect of various causes which interfere with the return of blood from this part of the body. The pressure of the thyroid bodies when greatly enlarged (goitre), enlarged lymphatic glands, and tumors in the neck pressing on the jugular veins have this effect. Aneurismal or other tumors within the chest produce the same effect by pressure on the descending vena cava. A not infrequent cause belonging in this category is an obstruction to the passage of the blood into the right side of the heart, the obstruction being due to dilatation of the right auricle and ventricle, resulting from an obstacle to the circulation through the pulmonary organs, incident either to valvular lesions at the mitral orifice within the heart or to affections of the lungs themselves. Of the latter, pulmonary emphysema is the affection which especially leads to this result. Passive congestion from these causes, even when considerable, is often tolerated without great inconvenience. The face is more or less congested, and if the congestion be great, there may be lividity or blueness especially marked in the space over the lips intervening between the skin and mucous membrane, which is called the *prolabia*. As regards the symptoms referable to the brain, passive congestion occasions a dull pain, a sense of fulness, sluggishness of the perceptions and the intellectual faculties, and defective or disturbed sleep. Occurring as an effect of the causes which have been named, the condition admits of relief only so far as these causes can be diminished; and in many cases this is impracticable. There is another cause of passive congestion within the skull, incident to the fact that the brain is removed from atmospheric pressure owing to the solidity and occlusion of the bones of the cranium, and also to the fact that the brain is not compressi-

ble to much extent by the forces which govern the intracranial circulation. The cranium forming a closed box capable of resisting the pressure of the atmosphere, and the substance of the brain not yielding much to the pressure of blood within the vessels, it follows that whenever the supply of arterial blood is lessened, a suction force is exerted upon the blood in the veins, and more or less passive congestion of the brain is a consequence. Passive congestion, thus produced, is supposed to be a morbid element in affections which involve a diminished supply of blood to the head. The latter is an effect of impoverishment of the blood and of deficient power of the heart's action. This element is supposed to account for certain head symptoms occurring especially in children affected with cholera infantum. The blood in this affection is impoverished by profuse discharges from the stomach and bowels, and the heart's action becomes enfeebled thereby. These head symptoms, namely, morbid somnolency, semi-coma, and sometimes convulsions, were formerly considered to denote either inflammation of the meninges of the brain or serous effusion, affections which were embraced under the name *hydrocephalus*; hence, as simulating these conditions, the passive congestion produced in the manner just stated has been called the *hydrencephaloid* affection. The proper treatment of this affection embraces measures to restore the normal condition of the blood and the strength of the heart by alimentation, tonic remedies, and the judicious use of alcoholic stimulants. The treatment heretofore employed, based on the supposition of inflammation and effusion, was not only without good effect, but hurtful. It must be admitted that in cases of passive congestion from a deficiency of the supply of arterial blood, it is not certain how far the morbid phenomena are attributable to the congestion, and how far directly to the lack of the arterial blood. II. CEREBRAL ANÆMIA. The term *anæmia* is used in medical writing and conversation to denote a morbid condition of the blood, namely, a paucity of the red globules. This is the condition which is understood when the blood is said to be impoverished. The term also denotes a morbid deficiency of blood in any of the organs of the body. The name *cerebral anæmia* implies the latter sense of the term. The affection therefore consists in a morbid deficiency of blood within the skull. The *anæmia* from certain causes is general, that is, it affects the entire contents of the skull; or it may be limited to a portion of the brain, the latter being incident to causes affecting branches of the intracranial arteries. An effect of general cerebral *anæmia*, existing in a marked degree and suddenly induced, is the occurrence of syncope, fainting, or swooning. In this condition there is loss of consciousness, the face becomes deadly pale, and there are convulsive movements with gasping for breath, the person appearing to be upon the brink of dissolution. The condition, indeed, is

but a slight remove from death. Prolonged syncope may occasion sudden death; but in general, after a brief period, the circulation within the skull is restored, and consciousness returns. The cerebral anæmia in attacks of syncope is usually caused by a suddenly induced weakness of the heart's action, and this may be occasioned by various causes. A powerful mental emotion may so affect the action of the heart as to cause an attack of syncope. The rapid loss of blood is a cause. Assuming an erect posture after recumbency from disease is another cause. Impoverishment of the blood, or the morbid condition of this fluid known as anæmia, favors the operation of the different causes which, by enfeebling the action of the heart, gives rise to syncope. The measures to be employed in syncope are those which tend to increase the power of the heart's action, and determine a flow of blood to the head. The body should be immediately placed in a recumbent position, with the head low. The impression produced by dashing cold water in the face excites the action of the heart, and often arouses instantly the consciousness. When consciousness returns, an ethereal or alcoholic stimulant may be given, and repose for a time should be enjoined.—General cerebral anæmia, greater or less in degree, and more or less persisting, is referable to various causes, such as compression of the arteries going to the head, valvular lesions of the heart involving obstruction and regurgitation, and feebleness of the heart's action incident to different pathological conditions. The symptomatic effects are drowsiness, inability to sustain mental efforts, pain in the head, ringing in the ears, and sometimes mental hallucinations and illusions. With reference to their effects, it should be added that, as stated under the head of passive congestion of the brain, a morbid fulness of the veins within the skull, compensatory for a deficiency of the supply of arterial blood, is inferred from the fact of the contents of the cranium being removed from atmospheric pressure, together with the incompressibility of the cerebral substance; so that it is not certain how far these effects are due, on the one hand, to anæmia, or, on the other hand, to venous congestion.—Partial cerebral anæmia, that is, anæmia limited to a portion of the brain, is a morbid condition over which much light has been shed within the past few years by the researches of Kirkes, Virchow, and others. The arteries of the brain, beyond what is known as the circle of Willis, do not inosculate freely with each other. Hence, if an arterial branch be obstructed, the distribution of blood within the area of the cerebral substance supplied by the obstructed vessel is arrested for a time; and this defective supply of blood may lead to impaired nutrition, ending sometimes in the loss of vitality or a condition analogous to gangrene. Now, the arterial branches distributing blood to the different portions of the brain are liable to be obstructed, first, by the coagulation of blood with-

in them, and second, by a mass of fibrine or a detached vegetation either from the left cavities of the heart or from an artery situated between the heart and the brain. The obstructing substance in the first of these two modes is called a *thrombus*, and the morbid condition is known as *thrombosis*; in the second mode the obstructing substance is called an *embolus*, and the condition *embolism*; hence, a thrombus is a stationary, and an embolus a migratory plug. Thrombosis is apt to take place in the vessels within the skull, the coagulation of the fibrine of the blood being due to changes in the arteries which roughen the inner surface of these vessels. The fibrine is liable to coagulate on a roughened surface over which the blood flows. This is shown by the experiment of inserting a needle or a thread within a blood vessel; masses of fibrine collect upon the foreign substance. Embolism occurs oftener than thrombosis. Fibrine, a product of thrombosis in the left cavities of the heart, in one of the arteries leading from the heart to the head, or in an aneurismal sac, is liable to become separated by the force of the circulating blood, and it is then carried along with the current into the cerebral arteries, until at length it reaches a vessel too small to admit of its passage further onward; it is thus arrested in its course, and, becoming fixed, it obstructs the circulation in the branches given off beyond the point where it remains. Hence, a partial anæmia, which is more or less circumscribed according to the size of the obstructed artery. The same thing occurs when the embolus or plug is a morbid growth or a vegetation, instead of a mass of fibrine. Both thrombosis and embolism occur in various parts of the body, as well as within the skull. In the latter situation, the artery most likely to become obstructed, especially by an embolus, is the middle cerebral; and embolism is far more likely to take place in the left than in the right middle cerebral artery, because the embolus generally comes from the heart, and the most direct route from the latter organ to the brain through the arteries is on the left side. Thrombosis and embolism give rise to that form of paralysis distinguished as hemiplegia, namely, paralysis affecting the limbs and often the face on one side. The paralysis from embolism occurs suddenly, being a stroke of palsy, because the obstruction occurs suddenly. Often with the sudden palsy there is a temporary loss of consciousness, constituting an apoplectic seizure. This is one of several different morbid conditions giving rise to sudden coma or apoplexy. In a certain proportion of cases, the paralysis disappears completely after a time, the circulation being more or less slowly restored beyond the point of the obstruction. Recovery takes place if the circulation be restored before important changes in nutrition have resulted from the deficient supply of blood. Softening and even complete loss of vitality of cerebral substance within the space deprived of arterial blood

take place in some cases, and more or less hemiplegic paralysis then remains. Hemiplegia, either transient or persisting, is in like manner an effect of thrombosis. It is generally developed gradually, and is not so likely to give rise to sudden coma or apoplexy, because, the coagulation not taking place all at once, the obstruction occurs more or less gradually. III. CEREBRAL HÆMORRHAGE. Hæmorrhage within the cranium may take place, first, either into the substance of the brain or the spaces known as the ventricles, and second, between the membranes investing the brain. The name cerebral hæmorrhage is applied especially to an extravasation in the two former of these situations. Situated between the membranes, it is distinguished as meningeal hæmorrhage. Hæmorrhage very rarely takes place primarily within the ventricles of the brain; when blood is found here, the seat of the extravasation is generally in the cerebral substance, and the blood has thence made its way into the ventricles. Hæmorrhage is the most frequent of the several morbid conditions giving rise to the sudden loss of consciousness which characterizes an apoplectic attack. In the great majority of the cases of apoplexy caused by this condition, the hæmorrhage takes place in the substance of the brain. The extravasation is seated in either the corpus striatum or the thalamus opticus much oftener than in any other of the anatomical divisions of the brain; it may, however, occur in any portion of the cerebral substance. The quantity of blood which escapes varies greatly in different cases. If very large, death may occur within a few hours. Sudden or almost instantaneous death, however, is very rarely if ever caused by cerebral hæmorrhage. If the extravasation be small, the patient emerges after some hours from the coma or apoplectic state; the clot may subsequently be absorbed, and recovery may take place, with more or less permanent injury of the brain. An apoplectic attack dependent on hæmorrhage into the substance of the brain is almost always accompanied by paralysis of the muscles of the limbs, and generally also of certain of the muscles of the face on one side of the body (hemiplegia). This is always a concomitant of an extravasation into the corpus striatum, or the motor tract of the fibres of the brain. The paralysis of the limbs, and generally also of the face, is on the side opposite to the cerebral hemisphere in which the hæmorrhage is seated. In some cases in which the extravasation is small, or in which it takes place slowly, hemiplegia, without apoplexy, is the effect. Hemiplegia, in the cases of apoplexy dependent on hæmorrhage into the substance of the brain, persists after the apoplectic state disappears; and in general this form of paralysis in a greater or less degree continues permanently, even when the extravasated blood has been absorbed. After an apoplectic attack from cerebral hæmorrhage, the mental faculties generally become more or less impaired. The degree of impairment will

depend on the amount of injury which is the immediate effect of the hæmorrhage, and on the disorganization due to the inflammation excited by the presence of the clot. It is also to a certain degree dependent on the diminished exercise of the mental faculties which is usual after an attack of apoplexy. Cerebral hæmorrhage is generally a consequence of disease of the arteries of the brain. They are liable to become instantaneously fatty, and to be rendered brittle by the deposit of calcareous matter. Hence, either with or without some unusual tension, such as is caused by violent muscular efforts or intense mental excitement, they give way, and extravasation occurs. Another condition favoring rupture is the formation of minute dilatations, which are called miliary aneurisms. These changes in the arteries rarely take place prior to middle age; hence, apoplexy and hemiplegia dependent on cerebral hæmorrhage seldom occur in youth.—During an attack of apoplexy dependent on extravasation of blood, little is to be done in the way of treatment beyond keeping the body of the patient quiet, with the head raised, removing all articles of clothing which make pressure on the neck or chest, and applying cold to the head. Bleeding under these circumstances, which was formerly resorted to, is now rarely employed. An active cathartic is generally given. If the patient emerge from the comatose state, the objects of treatment are the promotion of absorption of the clot, the prevention of a repetition of the hæmorrhage, and the recovery as far as practicable from the paralysis. As the changes in the vessels which occasioned the hæmorrhage continue, its recurrence is always to be apprehended. Yet not unfrequently life continues for many years and a second hæmorrhage does not occur. It is important to add that cerebral hæmorrhage is seldom preceded by premonitory symptoms. Hence, in general, vertigo, ringing in the ears, and other symptoms which naturally lead persons to anticipate an attack of apoplexy, are not to be thus interpreted. Much relief from needless apprehensions may often be afforded by recollecting the statement just made.—Hæmorrhage situated between the membranes of the brain, or meningeal hæmorrhage, is extremely infrequent in comparison with extravasation in the cerebral substance. This statement is especially true if cases in which meningeal hæmorrhage is attributable to injuries received on the skull be excluded. The latter are distinguished as traumatic cases. Excluding these, the seat of the hæmorrhage is generally beneath the arachnoid membrane. The blood escaping in this situation may be more or less diffused over the surface of the brain, remaining beneath the arachnoid membrane; or this delicate membrane may be ruptured, and then the blood is diffused over the brain within the arachnoid cavity, between the arachnoid and the dura mater. A small quantity of blood in this situation may not give rise to serious results, and it may even

be unattended with any violent symptoms referable to the head. A considerable hæmorrhage here, however, occasions insensibility or coma, which is developed suddenly or gradually, according to the rapidity as well as the amount of the hæmorrhage. The patient may emerge from this coma, and if the hæmorrhage recur, as is sometimes the case, the coma is again renewed. Usually, owing to the diffusion of the blood over the surface of the brain, there is not hemiplegia, as in cerebral hæmorrhage. Death may be expected to take place if the amount of the hæmorrhage be sufficient to occasion a prolonged or repeatedly recurring coma.—A form of meningeal hæmorrhage occurring independently of traumatic causes is known as hæmatoma of the dura mater. In this form, the blood is under the dura mater, and is contained within oval fibrinous sacs several inches in diameter and three or four inches thick. These are generally found on the upper surface of both hemispheres of the brain. The fibrinous sacs are supposed to denote inflammation. This affection occurs in children and in aged persons; but it is rare, and not determinable with certainty during life. Sooner or later it ends fatally, after having induced diminished power of motion of the limbs on both sides and stupor, which at length eventuates in coma.

IV. INFLAMMATORY AFFECTIONS. In the comprehensive sense of the phrase "diseases of the brain," inflammatory affections may be seated in either the membranes or the cerebral substance. Their primary seat is much oftener in the former than in the latter. Of the membranes investing the brain, the dura mater is very rarely inflamed. An inflammation seated in this, the outer of the cerebral membranes, or the meninges, is almost always limited to a circumscribed space, and is produced either by an injury of the head (traumatic), or by an extension of disease from a contiguous part of the skull. An idiopathic or spontaneous primary inflammation of this membrane perhaps never occurs, if the affection called hæmatoma of the dura mater be excluded. The term cerebral meningitis denotes inflammation of the membranes or meninges of the brain; but the term is considered as embracing only inflammatory affections seated in the pia mater and arachnoid membrane. Inflammation affects these two membranes conjointly; that is, whether the point of departure be in the one or the other, both are involved. Cerebral meningitis is acute, subacute, or chronic. In addition, a variety of the disease is called tuberculous meningitis. The term simple meningitis is used to distinguish an ordinary inflammation from the variety called tuberculous. Exclusive of traumatic cases, that is, those in which the disease is produced by injury from falls or blows, causes of simple acute meningitis are insolation, or exposure to great heat, and excessive indulgence in alcoholic stimulants. These causes are chiefly operative when adults are affected with the disease. Acute inflammation from other

causes than these, and from injuries of the head, occurs oftener in children than after adult age. In children it is sometimes developed in the course of scarlet fever, erysipelas, and measles. But simple acute meningitis, irrespective of traumatic cases, is extremely rare. The symptoms of acute meningitis are at the beginning essentially the same as in active cerebral congestion; and this, indeed, is the pathological condition. The prominent local symptoms are intense, diffused pain in the head, flushing of the face, notable intolerance of light and sounds, an increase of the sensibility of the surface of the body (hyperæsthesia), throbbing of the arteries of the neck and head, and delirium, which is often active or violent. Hallucinations, as well as delusions, enter into the delirium. With these local symptoms, there is symptomatic fever, as shown by frequency of the pulse, increased heat of the skin, and, more especially, augmented temperature of the body as denoted by the thermometer placed in the armpit. Convulsions sometimes occur. Other symptoms denoting constitutional disturbance are loss of appetite, often vomiting, constipation, disturbed rhythm of respiration, and more or less debility, except when the patient is under the excitement of delirious volitions. These symptoms belong to the first stage, or the stage of excitement, the duration of which varies from a few hours to several days. The symptoms which distinguish the second stage are due mainly to compression of the brain by the inflammatory products, lymph, serum, and pus, which are situated for the most part beneath the arachnoid membrane. These symptoms are somnolence ending in coma, paralysis of certain of the facial muscles, and sometimes of the muscles of the limbs, on one side, dilatation of the pupils, slowness and irregularity of the pulse, &c. These symptoms generally denote a fatal ending. This stage is distinguished as the stage of compression and of collapse. Simple acute meningitis is always a disease involving great danger to life. A very large proportion of cases end fatally. Life may be destroyed speedily, sometimes within a few hours. In most fatal cases the duration of the disease does not extend beyond a week. The measures of treatment which are appropriate to the first stage are: bloodletting by venesection and leeching, if there be no circumstances to contraindicate the abstraction of blood; cold applied to the head by means either of cloths wetted at short intervals in ice water, the cold douche, or the ice cap; and active purgation. As remedies which appear to diminish the blood within the skull, the bromides are to be recommended, clinical experience having shown their utility. In the second stage, the great object of treatment is to promote the absorption of the morbid products. Mercury and the iodide of potassium are prescribed for this object. Blisters may be employed for the same end. Alimentation, to an extent corresponding with the ability to take and digest nutritious food,

enters into the treatment in the second stage. —Acute cerebral meningitis may be associated with an acute inflammation of the corresponding membranes of the spinal cord. The affection is then called cerebro-spinal meningitis. This characterizes a remarkable and extremely fatal epidemical disease, generally known by the name epidemic cerebro-spinal meningitis. A subacute simple cerebral meningitis, in which the inflammation does not become chronic, is infrequent; but cases occur, chiefly in children. The symptoms in the stage of excitement are the same in character as in the acute disease, but notably less marked or intense. The symptoms due to compression may be developed after a slight or moderate headache, intolerance of light and sounds, febrile movement, &c.; and a fatal coma may be caused by an abundant serous effusion. The treatment in these cases relates chiefly to the absorption of serous effusion. —Subacute inflammation of the meninges of the brain is generally presented as a chronic affection, and is called chronic cerebral meningitis. The local symptoms are pain in the head, muscular weakness, undue disposition to sleep, change in the mental disposition or character, more or less impairment of the intellectual faculties, paralysis affecting sometimes certain of the facial nerves, and in some cases the two limbs on one side; and at length, in the great majority of cases, a fatal termination occurs, preceded by great exhaustion and frequently by coma. This affection may follow acute meningitis, but in general the inflammation is subacute from the outset. It is often latent; that is, it is not declared by well marked symptoms pointing to inflammation within the skull; and it is, therefore, liable to be confounded with other affections. Mental irritability and dulness of the faculties of the mind may for some time be the only symptomatic characters referable to the head. Moreover, it is by no means always easy to discriminate by the symptoms this affection from softening and other cerebral lesions. The duration of the disease is often long, not infrequently lasting many months, and even years. Sooner or later, it ends generally in death. The causes are usually obscure. Happily it is rare. There is not much prospect of benefit from drugs; but certain remedies, namely, mercury and iodine, may be tried. The great object of treatment is to maintain nutrition and thus enable the system to tolerate the disease as long as possible. —In tuberculous meningitis, the inflammation of the meninges is referable to the presence of tubercles or miliary granulations. These morbid products are seated at the base of the brain, and hence the inflammation is limited to or most marked at the base; whereas, in simple meningitis, the upper portion or convexity of the brain is chiefly or especially the seat of the inflammation. The ventricles of the brain in this affection are apt to contain liquid in more or less abundance, and hence formerly the affection was called

acute hydrocephalus. The affection is vastly more frequent in infancy and childhood than in after periods of life, but it occurs at all ages. It is almost invariably associated with tubercles in other organs, and especially in the lungs. In general, the development of this affection takes place gradually. For some weeks or months before the disease becomes declared, children generally show symptoms of ill health, namely, loss of appetite, indisposition to exercise, and more or less emaciation. Especially a mental change is noticeable, consisting in irritability of temper and dulness of the faculties of the mind. These symptoms probably relate to the tuberculous disease, and precede the acute inflammation. The latter is characterized by headache, generally intense and persisting, accompanied often by persistent vomiting; there is usually intolerance of light and sound; the face is apt to be flushed in paroxysms; there is fever, as shown by the pulse and temperature of the body. These symptoms continue for a period ranging from a few days to a fortnight; and then a change occurs which is attributable mainly to the presence of the inflammatory products, lymph, pus, and serous effusion. The pulse is now diminished in frequency, and it may fall considerably below the healthy standard; it is apt also to be irregular and faltering. The respiration is altered in rhythm, becoming irregular and suspirious. The pupils are dilated. The perceptions are blunted; the patient lies most of the time in a state of somnolency. Lancinating pains in the head are, however, felt from time to time, giving rise in infants to a sudden sharp cry which is quite distinctive. The temperature of the body may now fall below the minimum of health. The vomiting becomes less, or it may cease. The bowels are constipated, and the abdomen depressed. Convulsions, which sometimes occur before, are not infrequent after this change in the symptoms has taken place. Strabismus or squinting is common. Paralysis of the muscles of the face or of the limbs on one side is frequent. At length vision is lost; the somnolency eventuates in coma, and, under these circumstances, the affection ends fatally. The tendency to death is such, that when this affection is considered to exist, recovery is a ground for the rational presumption that the affection was not really present, but simulated. In children, it is liable to be confounded with typhoid fever, and with a condition already referred to, namely, cerebral anæmia incident to disorder of the digestive system. Moreover, it is not always easy to discriminate it from a simple acute meningitis. The iodide of potassium has been of late years chiefly relied upon in the treatment of tuberculous meningitis. Its efficacy, however, in any case is questionable; and there are no remedies at present known which can be given with any expectation of effecting a cure. The only hope, in cases which seem to present the evidence of existence of this affection, is that the diagnosis

may be incorrect. Blisters, active purgatives, and other debilitating and perturbatory measures of treatment are not only not indicated, but they increase suffering and hasten the fatal termination.—Inflammation either limited to or having its point of departure in the substance of the brain is known as *cerebritis*. As already stated, the substance of the brain is more or less involved in meningitis. Independently of the latter, cerebritis is rare; and if the cases be excluded in which inflammation of the substance of the brain is secondary to tumors or to the presence of a clot, or is incident to injuries, it is extremely infrequent. In fact, a primary or idiopathic cerebritis is one of the rarest of affections. Its infrequency has been rendered more evident within late years by the knowledge which has been acquired of necrobiosis, or softening from embolism and thrombosis, to which reference has been made under the head of anæmia of the brain. Cases of the latter kind of softening were formerly considered as cases of cerebritis. The presence of blood giving rise to "red softening" has been considered as evidence of inflammation; but this is now held to be an error. Softening from defective nutrition may be red as well as white. The positive evidence of cerebritis is the presence in the cerebral substance of the inflammatory products, fibrine or pus. Cerebritis, as a primary or idiopathic affection, is always circumscribed, or confined to a limited space. It occurs chiefly in the gray matter of the brain, that is, in the cortical portion of the corpus striatum. If pus be present, it is called abscess of the brain. The symptoms and the duration in different cases entitle it to be considered either an acute or a chronic affection. If acute, pain in the head is more or less prominent as a symptom, and there are present the symptoms denoting hyperæmia or cerebral congestion. Spasms of certain muscles, either tonic or clonic, may occur, and sometimes there are general convulsions. Subsequently, when the inflamed portion becomes disorganized, that is, when softening or the formation of an abscess ensues, paralysis generally occurs. The paralysis is developed gradually, and in different cases different muscles are affected. In most cases the muscles of the face are paralyzed in a greater or less degree, and hemiplegia is common. The mental faculties become impaired, as denoted first by a morbid emotional susceptibility, and afterward by loss of memory and inability to carry on processes of ratiocination. At length mental imbecility or dementia is likely to occur. Chronic cerebritis, or abscess of the brain, presents the same symptoms which belong to the acute form after softening or suppuration has taken place. The points of distinction, as regards the symptomatology, between the acute and chronic affection, relate to the presence of symptoms denoting more distinctly an inflammatory condition in the former, and a longer duration of the disease in the latter. Chronic cerebritis

or abscess is not easily discriminated during life from other affections which are to be noticed presently under the head of structural lesions. Cerebritis, both acute and chronic, is generally secondary to injuries of the skull, or to disease of the bones of the head. It is apt to follow caries of the petrous portion of the temporal bone, the latter being connected with inflammation of the internal ear. It may fairly be doubted if recovery ever takes place. Chronic cerebritis, however, leading to softening or abscess, is not incompatible with a long duration of life, death at length occurring, perhaps, in consequence of some intercurrent disease. The indications for treatment relate to palliative measures, and those which enable the system to tolerate the affection as long as possible. V. STRUCTURAL LESIONS. Lesions involving palpable changes in structure, affecting the brain more or less extensively, and with different degrees of damage, are of various kinds. Important lesions have already been referred to, namely, softening from defective nutrition, and either inflammatory softening or suppuration. Another lesion, probably of inflammatory origin, is induration or sclerosis. Other lesions are the morbid growths or deposits which constitute the different tumors of the brain. These various structural changes have certain symptoms in common, and in medical practice it is by no means easy always to differentiate them. Induration of the brain, or sclerosis, may be confined to one situation which is more or less extensive, or it affects small circumscribed portions which are more or less numerous. The former is distinguished as diffused, and the latter as multiple cerebral sclerosis. The diffused form most frequently occurs in children, although it may occur at any period of life. It is a pathological condition which in certain cases affords an explanation of idiocy. It leads to paralysis, and consequently to an arrest of development of certain of the voluntary muscles. It may lead to contractions and deformities in consequence of the extensor muscles being more paralyzed than the flexors, or *vice versa*; the muscles which are the least paralyzed contracting for want of the normal antagonism afforded by those in which the paralysis is greatest. In multiple cerebral sclerosis, hardened nodules, varying in size from a cherry stone to a small walnut, and more or less numerous, are scattered throughout the brain, generally being found in the white substance. They are produced by a morbid growth of the connective tissue, that is, the tissue which unites the nervous fibres and cells together with the blood vessels. This tissue is now known by the name neuroglia. Its morbid growth is supposed to be a consequence of chronic inflammation. The hypertrophied neuroglia induces by pressure atrophy of the nervous structure, and consequently impairment of function in the sclerosed portions. The causes are obscure; but circumstances connected with age have a

marked influence on the causation. It very rarely occurs in persons under 50 years of age. Muscular tremor, beginning slightly in a few muscles and gradually increasing and extending, is one of the most characteristic of the symptoms. After a time the limbs and sometimes the head are involved in the tremor, which at first can be arrested by volitional efforts, and exists only in the waking hours, but at length continues in spite of the will and during sleep. Paralysis greater or less in degree follows the tremor. The name *paralysis agitans*, or shaking palsy, has been applied to these cases. Prior to and with these symptoms lancinating pains in the head are common. Distortion of the limbs may occur from the paralysis affecting certain muscles (generally the flexors) more than others. Certain cases present remarkable peculiarities in the mode of progression. Thus some patients are able to run forward rapidly when they cannot walk, and are obliged to support themselves by clinging to some solid body in order to prevent themselves from falling when they stop. In other cases patients are able to walk backward, but not forward. The course of this affection is usually slowly progressive; yet in some cases it remains stationary. Existing in a marked degree, it may not prevent long life. A cure is not to be expected; but improvement is sometimes effected by the chloride of barium, the phosphide of zinc, strychnia, and electricity. The tolerance and duration of life are promoted by measures which tend to improve the general health, and maintain it at the highest possible point. Multiple sclerosis of the brain is not infrequently associated with a similar affection of the spinal cord.—Tumors within the cranium have the different anatomical characters which belong to tumors in other situations. The most frequent are those distinguished as cancerous, tuberculous, and syphilitic. Others which are comparatively rare are aneurismal, fibro-plastic, and parasitic, the latter consisting of the cysticercus or hydatids. There are still others which are occasionally found. The different tumors vary in number, size, and situation. There may be but one tumor, or the number may be great; in the latter case, they are usually small. They may be very small, not exceeding the size of a pin's head, or they may be as large as an orange, or even larger. They may be seated in different portions of the cerebral substance, or they may have their point of departure from the membranes, and sometimes from the bony structure. They produce morbid effects, or symptoms, by pressure on the cerebral structure together with the nerves within the skull, and by giving rise frequently to circumscribed inflammation, which may lead to either induration or softening. The more grave of these morbid effects are paralysis affecting different parts, and more or less impairment of the intellectual faculties. Convulsions belong among their effects. They are

generally accompanied with pain localized within a circumscribed space, and vertigo is not uncommon. The system suffers in proportion to the amount of the injury which the brain receives, and frequently also from the general condition with which the local affection is associated. The latter applies especially to cancerous and tubercular tumors. Sooner or later, as a rule, they destroy life. The local symptoms which denote especially tumor within the skull are a localized persistent pain, and the occurrence of paralysis affecting different parts successively, after intervals of varying duration. Frequently, but not always, these points suffice for a positive diagnosis of tumor of some kind. The associated circumstances, such as tuberculous or cancerous disease elsewhere, or the fact of syphilis having existed, enable the physician to decide with considerable confidence on the nature of the tumor. Moreover, its situation may frequently be inferred from the parts which are paralyzed, together with the amount and kind of mental disturbance. With our present knowledge, curative treatment is limited exclusively to syphilitic tumors. The effect of anti-syphilitic medication, where the symptoms denote the existence of tumor of this kind, is sometimes remarkable. It is, therefore, highly important that the physician should know the grounds for supposing the tumor to be syphilitic in character. Mercury and the iodide of potassium are the remedies indicated if the tumor be syphilitic.—A curious morbid condition, incident to different structural lesions, and sometimes occurring as a functional affection, may be noticed in this connection. Reference is had to the condition now generally known as *aphasia*. This term signifies loss of speech, not from any affection of the organs concerned in phonation, but from either an inability to remember words, or a want of power to coördinate the movements involved in speech. As thus defined, aphasia is to be distinguished from aphonia, the latter term denoting loss of voice from an affection of the vocal apparatus, or from a paralysis affecting the muscles concerned in phonation. In aphasia the vocal organs are unaffected, and the patient has voluntary control over the muscles of the larynx and mouth. Nor is aphasia to be confounded with loss of speech in consequence of dementia or mental imbecility. Patients affected with aphasia understand what is said to them, and they are able to read; but the ability to express their ideas in language is lost or more or less impaired. A marked difference exists among different cases of aphasia. In some, while the patient is unable to speak, there is the ability to communicate their ideas by writing; in other cases, the patient can neither speak nor write. Hence, according to this difference, aphasia is of two kinds, namely, amnesic and ataxic. In amnesic aphasia both speaking and writing are lost or impaired; in ataxic aphasia speech is lost, but the ability to write remains.

In the first kind, the difficulty consists in the loss of the memory of words; in the second kind, the difficulty seems to lie in the inability to coördinate the movements necessary to speech, the memory of words being preserved. Aphasia of either kind may be complete, when speech is entirely lost, or there is more or less impairment of the power of speaking. Frequently the vocabulary of the patient is limited to a few words, perhaps a single word, uttered whenever an attempt is made to speak. Thus, patients may be able to say only *yes* or *no*, and this is said in answer to any question. It is not easy to determine, in cases of aphasia, to what extent, if at all, the mental powers are affected; but it is certain that complete aphasia may exist while the faculties of the mind, aside from speech, are not materially affected. As already stated, aphasia may be incidental to different structural lesions, namely, hæmorrhage into the substance of the brain, softening from embolism or thrombosis, cerebritis, induration, and tumors. Generally it is associated with hemiplegia, and the paralysis is usually on the right side, the local affection of the brain being situated in the left hemisphere. And now a remarkable fact is to be stated: the lesion giving rise to aphasia in the great majority of cases is seated in a particular portion of the left cerebral hemisphere, namely, the posterior part of the third convolution of the anterior lobe of the cerebrum. This fact has led to the supposition that the portion of the left hemisphere first named is to be regarded as the seat of the faculty of language; but, as opposed to this, although the rule is as stated, there are some exceptions to it. Evidently, if the faculty of speech depended on the integrity of a particular part of the brain, that part should be affected in all cases of aphasia. Aphasia is generally a symptom of a lesion of some kind; and it is then almost always persistent. There may, however, be some improvement as regards speech, although recovery do not take place. In some cases it is apparently dependent on a functional condition, and it is then recovered from. Aside from the measures of treatment which may be indicated by the nature of the lesion with which it is associated, or the circumstances connected with it when it is functional, efforts to speak on the part of the patient should be enjoined. Something may be accomplished by systematic endeavors to recover the memory of words or the power of coördinating the movements involved in speaking. VI. FUNCTIONAL DISORDERS. The term functional disorder, as now used, denotes a morbid disturbance of functions taking place independently of either inflammation or any palpable alteration of structure. It is convenient to arrange certain affections under this head, notwithstanding it is doubtless true that every so-called functional disorder involves some structural change. Admitting this, a disorder is to be distinguished as functional if it be non-inflammatory, and the circumstances are such as to exclude all the different varieties

of structural change which morbid anatomy, in the present state of our knowledge, recognizes. With this definition, what are the functional disorders referable to the brain? The different kinds of mental derangement—mania, monomania, melancholia, dementia—may be considered as varieties of functional disorder of the brain. (See INSANITY.) In this statement it is implied that, in a certain sense, the normal intellectual and emotional faculties are to be regarded in the light of cerebral functions. We may assume such to be the fact, without any skepticism as to the existence of the soul, in which consists personality, and which will survive the body, albeit it is in the order of Providence that in the present life the exercise of the mental faculties, and even the consciousness of being, are dependent on the physical organism. The phenomena embraced under the name delirium, and the more or less complete loss of consciousness and volition called coma, are evidences of functional disorder of the brain occurring in connection with various diseases, without involving either cerebral lesions or inflammation. These forms of functional disorder occur in fevers, and also in various local affections. Under these circumstances the brain is functionally disordered in consequence of morbid conditions of the blood. Thus the delirium of typhus and typhoid fever is referable to those blood changes, imperfectly understood as yet, in which consists the essential pathology of these diseases; and the coma occasioned by certain diseases of the kidneys is an effect of an accumulation of uræa in the blood, or uræmia. Various remedies, by a toxic effect on the brain, may give rise to functional delirium or coma. This is true of opium, belladonna, and other narcotics, chloroform, &c. The phenomena of drunkenness denote functional disorder due to the presence of alcohol in the blood which circulates within the skull. There are certain nervous affections distinguished as functional, and called the *neuroses*, in which the functions of the brain are perverted or impaired; examples are epilepsy, hysteria, hydrophobia, and ecstacy. Finally, irrespective of all the foregoing affections, the faculties of the mind are often affected, but not sufficiently to constitute either coma, delirium, or insanity, and certain cerebral symptoms occur as results of functional disorder of the brain. Mental depression, irritability of temper, painful sensations referable to the head, vertigo, and wakefulness are manifestations of functional disorder due to over-exercise or excitation of the mental powers, intellectual or emotional, prolonged anxiety, impoverishment of the blood (anæmia), and probably by various morbid conditions of the latter incident to disordered assimilation, the retention of matters which should be eliminated by the different excretory organs, or the introduction of morbid principles by means of the air. The relations of functional disorder of the brain to the happiness of individuals and the welfare of mankind

is a subject of much importance, to which only this simple reference is here appropriate.

BRAINARD, Daniel, an American surgeon, born at Whitesboro, Oneida co., N. Y., May 15, 1812, died in Chicago, Oct. 10, 1866. He took the degree of M. D. at the Jefferson medical college, Philadelphia, in 1834. In the spring of 1836 he delivered a course of lectures on anatomy and physiology at the Oneida institute, and in the latter part of the same year removed to Chicago. In 1839-'41 he visited Europe for professional improvement, and was soon afterward appointed professor of anatomy in the university of St. Louis. In 1843 he took part in the organization of the Rush medical college at Chicago, in which he was professor of surgery during the remainder of his life. His reputation, otherwise than as a surgical practitioner, in which respect he held perhaps the most prominent position in the northwest, rests upon his advocacy of subcutaneous perforation of ununited bones for the cure of false joint, and the treatment of serpent bites and other poisoned wounds or unhealthy inflammations by means of alterative injections. Besides numerous papers in the "American Journal of the Medical Sciences," and other periodicals, he published an essay "On the Treatment of Ununited Fractures and Deformities," the prize essay of the American medical association for 1854. For some years he was engaged upon an extensive surgical work, which was unfinished at his death.

BRAINARD, John Gardiner Calkins, an American poet, born at New London, Conn., Oct. 21, 1796, died there, Sept. 26, 1828. He graduated at Yale college in 1815, and began the study of law, but soon abandoned it to become editor of the "Connecticut Mirror," at Hartford. He published many poetical compositions in this journal, usually in the form of ballads. A volume of his poems was published in New York in 1825, and after his death an enlarged edition appeared in 1832, with the title "Literary Remains." A third edition was published in 1842 at Hartford, with a memoir by John G. Whittier, the Quaker poet.

BRAINE-L'ALLEUD, or **Braine-la-Léude**, a town of Belgium, in the district of Nivelles, province of South Brabant, 10 m. S. of Brussels; pop. about 5,000. Agriculture is the principal occupation, but there are manufactures of cotton goods, leather, glass, and starch. A mound surmounted by a colossal lion commemorates the battle of Waterloo, which was partly fought in this commune.

BRAINE-LE-COMTE, a town of Belgium, province of Hainaut, on the Senne, 18 m. N. N. E. of Mons; pop. in 1869, 6,464. It contains a fine chateau, and the handsome church of St. Gery, with a richly carved altarpiece. It is famous for the cultivation of flax and the manufacture of Brussels lace. There are also other branches of industry. Count Baldwin in the 12th century bought the ground from the monks of Mons.

BRAINERD, David, an American missionary, born at Haddam, Conn., April 20, 1718, died at Northampton, Mass., Oct. 9, 1747. In 1739 he entered Yale college to prepare himself for the ministry, but was expelled in 1742, for having said of one of the tutors that he had no more of the grace of God than a chair. He was licensed the same year as a preacher, and received an appointment from the society for the propagation of Christian knowledge, as missionary among the Indians near Stockbridge, Mass. He was ordained in 1744, and went on a mission to the Indians at the forks of the Delaware in Pennsylvania, making two visits to the Indians of the Susquehanna. He met with little success until, after a year, he went to reside among those at Crosswicksung near Newark, N. J. Here he is said to have produced a great change among the savages, and to have baptized 78, of whom 88 were adults. In 1747 he went to Northampton, Mass., where he died after a short stay in the family of Jonathan Edwards, by whom his biography was soon afterward written. A new edition of this work, together with his journals, *Mirabilia Dei apud Indicos*, and "Grace Displayed," was published in 1822.

BRAINTREE, a town of Norfolk county, Massachusetts, on the Old Colony and Newport, and South Shore railroads, 10 m. S. of Boston; pop. in 1870, 3,948. The manufacture of boots and shoes is extensively carried on; there are also manufactories of linen, woollens, paper, machinery, carriages, &c. John Adams and John Quincy Adams, presidents of the United States, were born in BRAINTREE, in the part which in 1792 was set off as the town of Quincy, where the Adams family now have their summer residence. John Hancock was also born in the same town.

BRAKE, or **Braake**, a town of Germany, in the grand duchy of Oldenburg, on the left bank of the Weser, 20 m. N. W. of Bremen; pop. 4,077. It carries on considerable trade and ship building, having been a free port since 1834. Until the foundation of Bremerhafen in 1827, Brake was the actual port of Bremen, as vessels of considerable size could ascend the Weser to this point. About 500 vessels a year still arrive at Brake.

BRAKE, or **Break**, an instrument for retarding or arresting by friction the motion of wheels. When applied to a hoisting reel, it consists of a flexible band of iron bent around a wheel; one end of the band is made fast to the frame of the reel, and the other end is attached to the small arm of a lever, the whole being so arranged that a slight pull on a rope attached to the long arm of the lever tightens the iron band on the rim of the wheel, which is arrested by the consequent friction. A carriage brake in its primitive form consists of a beam placed crosswise under the frame of the vehicle, and supporting two curved blocks of wood, one at each end, which may be firmly pressed against the periphery of the wheels. The brake was

formerly an instrument of little importance, and prior to 1835 only one patent for a brake was granted in the United States. Since the adoption of high speed upon railroads the subject of brakes has become one of great interest. There are two kinds used on railroad carriages, the ordinary brake for stopping the train at stations, and the safety brake, which may be applied instantaneously to the wheels of all the carriages on a train for the purpose of bringing it to a sudden halt. The ordinary car brake consists of a friction block, a lever, a chain and rod for moving the lever, and a windlass upon the platform of the car. The general plan and principle of action are represented in fig. 1,

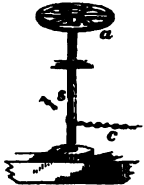


FIG. 1.

where *a* is the wheel turned by the brakeman, *s* the shaft around which the chain *c* is wound, forming the windlass, which by the action of simple levers draws the friction blocks *b b*, fig. 2, against the periphery of the wheel. The application may be made in various ways.—Of the safety

brakes there are several, but they may all be divided into three kinds: the first, in which the power is derived from a coiled spring; a second, in which it is derived from compressed air contained in a cylinder; and a third, in which electro-magnetism is the motive power. All these brakes employ the same friction block and leverage, which is connected with the windlass ordinarily turned by the brakeman. What is known as the Creamer brake, which is extensively used in the United States, employs a spiral spring as the motive power. This spring is coiled in a drum, which is placed upon the platform of the car, and through the drum passes the shaft, which is turned by the brakeman. The general arrangement is represented in fig. 3, in which *d* is the drum containing the spring, *s* the shaft, and *c* the chain (corresponding to *s* and *c* in fig. 1). The spring is wound up by means of a special attachment to the shaft turned by the brakeman, which can be connected or disconnected at pleasure. A cord, *r*, is attached by one end to the rope which passes through the train, and by the other to the lever

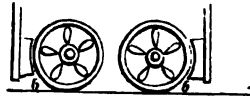


FIG. 2.

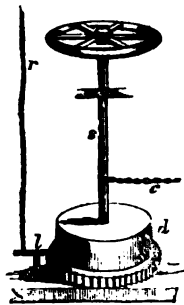


FIG. 3.

l, which on being pulled by the cord liberates the spring, causing it to exert its force through the chain and lever upon the friction block, drawing it against the wheel.—The compressed air brake used in the United States

is known as the Westinghouse air brake, and is made at Pittsburgh, Penn. Under each carriage there is placed a cylinder, fig. 4, 18 or 20 inches in length and about 8 inches in diameter, which is connected by metallic pipes and india-rubber tubing with a reservoir of compressed air attached to the engine, and which by a force pump receives a pressure of about 60 lbs. to the square inch. When the engineer wishes to



FIG. 4.

bring the train to a sudden stop, he opens a valve leading from the air chamber to the various cylinders under the carriages. The air rushes through the tubes, and, pressing upon the piston heads, moves them. By a connection with the piston rods the friction blocks are forced against the wheels simultaneously throughout the whole train.—An electric brake, devised by M. Achard of Paris, is described in President Barnard's "Report of the Paris Exposition of 1867," but it does not possess the practical advantages of either the Creamer or the Westinghouse brake.

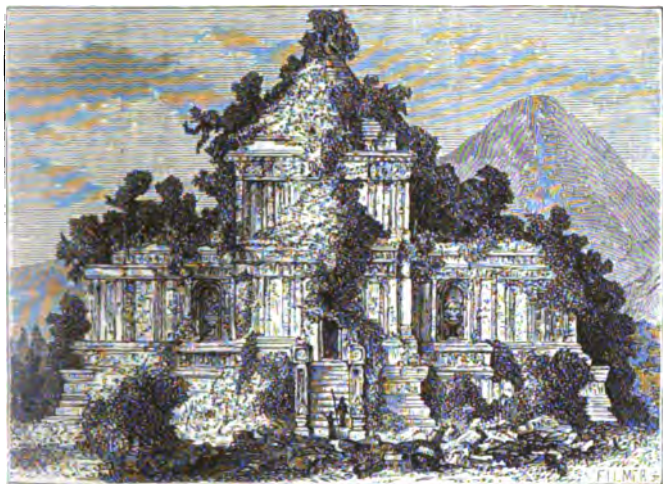
BRAKENBURG, Regner, a Dutch painter, born at Haarlem about 1650, died there in 1702. He selected his subjects frequently from low life, which he illustrated with great truthfulness and humor. His pictures are numerous in France and the Low Countries.

BRAMAN, Joseph, an English engineer, born at Stainborough, Yorkshire, April 13, 1749, died Dec. 9, 1814. He showed at an early age a remarkable mechanical ingenuity, was apprenticed to a carpenter, and subsequently removed to London, where he worked for a cabinetmaker, and afterward set up in the same business for himself. In 1784 he took out a patent for his widely renowned locks. Among many other inventions, he devised the hydraulic press, which is used not only in the ordinary mode of a press, but also for lifting enormous weights. He was the inventor of a mode of printing the number and date of bank notes used in the bank of England, by which the services of 100 clerks out of 120 were dispensed with. In 1812 he secured a patent for the construction of main pipes through the principal streets of a city, of sufficient strength to withstand great pressure to be applied by force pumps. The object of this invention was to provide the means of extinguishing fires without the aid of a fire engine.

BRAMANTE D'URBINO, an Italian architect, whose real name was DONATO LAZZARI, born at Monte Asdrualdo, near Fumignano, in 1444, died in Rome in 1514. At an early age he was placed as pupil with Fra Bartolommeo, and several of his pictures are still preserved at Milan. Having gone to Rome, he executed a few frescoes, but his taste was wholly for architecture, and his study of the antiquities of the city confirmed this bias. His erection of

the cloister of the convent della Pace obtained him the patronage of Pope Alexander VI., for whom he executed the Cancellaria, or palace of the chancery. Julius II. afterward employed him to draw plans for the Belvedere. He also built the oratory or temple in the cloister of San Pietro in Montorio. He was the author of the original design of St. Peter's, and had completed the four great piers that support the dome when he died. His plan was not adhered to by Michel Angelo, who completed the edifice. Bramante was the uncle of Raphael.

BRAMBANAN, a small native town of Java, in the sultanate of Jokjokarta, and about 10 m.



The Great Temple at Brambanan.

distant from the capital of that state. The name signifies "abode of Brahma;" and in its immediate vicinity are the remains of several magnificent temples, which were evidently devoted to the worship of that god. Eight of them are in a fine state of preservation. Sir Stamford Raffles, in his history of Java, gives a full account of these edifices, and fine illustrations of them, in a restored condition, are to be found in the plates accompanying the London edition of 1830 of his work.

BRAMBLE, the wild bush that bears raspberries and blackberries, belonging to the natural order *rosaceæ*, and constituting the genus *rubus*. The essential characters of the genus are: calyx 5-parted, without bractlets; petals 5, deciduous; achenia usually many, collected on a spongy or succulent receptacle, becoming small drupes. Nearly 200 species of this genus have been described. They are perennial herbs, or somewhat shrubby plants, with white (rarely reddish) flowers, and edible fruit; and they are universally diffused over the mountainous and temperate regions of the old and new world. Among the European species are the *R. fruticosus*, or common blackberry, having digitate leaves, with from 3 to 5 leaflets, white panicle flowers, and black or purple

fruit, common throughout Europe in hedges and thickets; the *R. cæsius*, or dewberry, a rougher and more prickly species than the preceding, with trailing stem, found in Europe and in N. E. Asia; the *R. arcticus*, a dwarf species, found in mountainous and northern regions, each stem producing a single highly esteemed fruit; and the *R. idæus*, or common raspberry, having minute leaves, with from 3 to 7 leaflets, villose, with upright and bristly stems, drooping flowers, and a light-red finely flavored fruit, common from the Himalayas to Ireland. Among the American species are the *R. strigosus*, or wild raspberry, closely resembling the

last, but having longer petals, common on thickets and hills, especially throughout the northern states; the *R. occidentalis*, black raspberry, or thimbleberry, glaucous, with recurved stems, armed with hooked prickles, with umbellate flowers and a purple-black fruit, found in thickets and fields from Canada to the West Indies; the *R. odoratus*, a sweet-scented raspberry, with fragrant foliage, large purple flowers, and a shrubby stem, found on rocky banks northward from the Alleghannies; the *R. villosus*, or high blackberry, shrubby, armed with stout prickles, having 3 or 5 ovate, unequally serrate leaflets, numerous racemed flowers, and a blackish fruit, common in the borders of



Dewberry (*Rubus cæsius*).

thickets, and varying much in size and aspect; the *R. Canadensis*, low blackberry, or dewberry, shrubby, trailing, prickly, common on

rocky or gravelly hills, and having a large and sweet fruit; and the *R. trivialis*, or low bush



Blackberry (*Rubus villosus*).

blackberry, with evergreen, nearly glabrous, ovate-oblong or lanceolate leaves, and large petals, growing chiefly in sandy soil southward.

BRAMHALL, John, an English divine and polemic, born at Pontefract, Yorkshire, about 1593, died in Ireland in June, 1663. He was created bishop of Londonderry in 1634, and archbishop of Armagh in 1661, and was instrumental in restoring the temporalities, and inducing the church of Ireland to embrace the 39 articles. In 1640-'41 he was impeached, together with several of Lord Strafford's coadjutors, by the Irish house of commons. After the battle of Marston Moor he retired for a time to Hamburg. He was an industrious controversial writer, and is chiefly known by his dispute with Hobbes "concerning liberty, necessity, and chance." His works were republished in the "Library of Anglo-Catholic Theology" (5 vols., Oxford, 1842-'5).

BRAN, the husky covering which separates from grain when it is ground and bolted. Rye and wheat bran contain different proportions of constituents, as is shown by the following analyses by Oudemans and Poggiale:

CONSTITUENTS.	RYE BRAN.	WHEAT BRAN.	
	Oudemans.	Oudemans.	Poggiale.
Ash.....	8.35	6.52	5.5
Water.....	14.55	14.07	12.7
Fat.....	1.58	2.46	2.9
Nitrogenous matter.....	14.50	18.46	13.0
Dextrine.....	7.79	5.52	7.9
Starch.....	88.19	26.11	21.7
Cellulose.....	21.35	30.80	34.6
Sugar.....			1.9
Total.....	101.59	98.94	100.0

Payen found that the gluten in the grain increased in quantity from its centre toward the outer covering, thus showing that the removal of the husk must abstract a part of the most nutritious portion. Bread made of unbolted

flour is often used as a laxative article of diet in dyspepsia. In France and Germany it is the common food of the peasantry, and among no people are complaints of indigestion more rare. It has been found by experiment that dogs can live on bran bread, though they cannot on flour bread. But according to Poggiale, when animals are fed on it they rapidly lose flesh; this may be caused by its too irritating properties when fed alone. Mixed with all the flour, it probably yields considerable nutriment. It contains the nitrogenous principle cerealine, analogous to diastase, possessing the property of changing starch into dextrine and grape sugar.—Calico printers remove the non-mordanted colors from maddered goods by boiling them in bran water. Dyers use bran in making the "sour water" for preparing their dyes.

BRANCALEONE, Dandelo, an Italian statesman, died in 1258. He was a Ghibelline senator of Bologna, and in 1253 was invited by the Romans to become their podestà with dictatorial powers. He restored peace and order, and Gibbon says that "no criminals were so powerful as to brave, so obscure as to elude, the justice of the senator." He caused two members of the noble Annibaldi family to be executed, and demolished in the city and its environs 140 towers which served as shelters to the disturbers of the peace. He curbed the power of the pope, the clergy, and the nobles, and put down public robbery with an iron hand. But the people, though benefited by his administration, became exasperated against him; he was deposed, arrested, and probably would have been executed if he had not provided against this by retaining at Bologna as hostages 30 members of the most eminent Roman families. Bologna was in consequence placed under interdict by Pope Innocent IV. The Roman people at length began to appreciate the great services of Brancalone, and in 1256 he was brought in triumph from prison to the capitol, and continued in power during the remaining two years of his life. His death was regarded as a public calamity; and "his head, enclosed in a costly vase, was deposited on a lofty column of marble." His biography is in the *Historia Major* of Matthew Paris.

BRANCH, a S. county of Michigan, bordering on Indiana; area, 528 sq. m.; pop. in 1870, 26,226. The St. Joseph and Prairie are the principal rivers; there are several small lakes. The Michigan Southern and the air-line division of the Michigan Central railroad pass through the county, and the Fort Wayne, Jackson, and Saginaw railroad touches the S. E. corner. The soil is a rich sandy loam; the surface undulating and occupied by dense forests and oak openings. Iron is found in several places. The chief productions in 1870 were 420,706 bushels of wheat, 454,593 of corn, 185,707 of oats, 822,145 of potatoes, 35,691 tons of hay, 684,689 lbs. of butter, 277,261 of wool, 62,637 of maple sugar, and 228,425 of flax. There were 7,704 horses, 7,313 milch

cows, 8,832 other cattle, 60,877 sheep, and 14,528 swine. Capital, Coldwater.

BRANCHIOPODA (Gr. *βράχια*, gills, and *πούς*, a foot), an order of the section *entomostraca* of the crustacea, the animals of which are small, mostly inhabit stagnant fresh water, and are provided with feet which are used only for swimming, except that in some instances they contain the organs of respiration. The bodies are protected by a corneous or membranous covering, with a shield in one piece, or divided like a bivalve shell. One species, the *branchipus stagnalis*, is common in New England in stagnant pools. It is about an inch long, and is furnished with numerous fringed legs, which are in constant motion.

BRANCO, Rio, a river of N. Brazil, rises from various sources in the Pacaraima mountains on the confines of Venezuela and British Guiana. After a S. course of about 400 m., in which it receives numerous affluents, it falls into the Rio Negro, in lat. 1° 25' S., lon. 62° 10' W.

BRANDE, William Thomas, an English chemist, born in London, Jan. 11, 1788, died at Tunbridge Wells, Feb. 11, 1866. He received his early education at Westminster, subsequently attended the lectures at St. George's hospital, commenced lecturing on chemistry in 1808, and in the following year was chosen fellow of the royal society. In 1812 he became professor of chemistry and materia medica to the apothecaries' company, and in 1851 was elected master. In 1813 he was appointed professor of chemistry at the royal institution, and was for many years associated with Faraday as editor of the "Quarterly Journal of Science." In 1825 he was appointed superintendent of the die department of the royal mint, and some years after fellow and examiner of the London university. Besides his "Manual of Chemistry" (6th ed., 1848), he published "Outlines of Geology" (1839), and a "Dictionary of Science, Literature, and Art" (royal 8vo, 1842; revised ed., 8 vols. 8vo, 1865-7).

BRANDENBURG. I. A central province of Prussia, consisting chiefly of the ancient mark of Brandenburg, bounded N. by Mecklenburg and Pomerania, E. by the provinces of Prussia and Posen, S. by Silesia and the kingdom of Saxony, and W. by Prussian Saxony, Anhalt, and Hanover; area, 15,402 sq. m.; pop. in 1871, 2,863,461, of whom about 70,000 were Roman Catholics, 40,000 Jews, and the remainder Protestants. It embraces the former territories of Priegnitz and Uckermark in the north, Havelland and Banim in the centre, Neumark in the east, and Mittelmark and Lower Lusatia in the south. It is divided into the districts of Frankfort and Potsdam, which are subdivided into 81 circles. The chief towns are Berlin, Potsdam, Frankfort-on-the-Oder, Brandenburg, and Spandau. The principal streams are the Elbe, Oder, Havel, and Spree. The surface, which is mainly level, is dotted with numerous lakes, swamps, and morasses, many of which have been drained. The soil

is generally sandy and poor, but near the lakes and streams rich land is found. The principal productions are buckwheat, rye, potatoes, wool, flax, tobacco, and honey. Manufacturing is extensively pursued, and the province is intersected by numerous railroads and canals. Lime and gypsum are found.—Brandenburg was originally inhabited by various German tribes, chiefly of the Suevic race, who were succeeded in its possession by Wends, Wiltzes, Obotrites, and other Slavs. These were subjected to the Frankish sway by Charlemagne, but subsequently recovered their independence, and carried on long feuds with their neighbors the Thuringians and Saxons, until parts of their territory were conquered about 927 by the emperor Henry the Fowler, who founded the Nordmark, or mark of Salzwedel (subsequently known as Altmark, and now forming the northern part of the Prussian province of Saxony). His son Otho I. founded the bishoprics of Brandenburg and Havelberg, and the Germanization of the country now kept pace with its Christianization, the Wends and other Slavs stubbornly contesting the possession of the territories E. of the Elbe. New marks were now successively erected by the emperors in the conquered territories. The subjection of the Slavs was completed by Albert the Bear, count of Ballenstedt, of the house of Ascania, who in 1133 was appointed by the emperor Lothaire margrave of the Nordmark. Albert conquered the Priegnitz territory and the Mittelmark, and assumed the title of margrave of Brandenburg. He founded many towns, and drew German and Flemish settlers into the country. He was also made duke of Saxony, but was unable to maintain this possession against Henry the Lion. Without being himself endowed with the electoral dignity, he may be considered the founder of the electorate of Brandenburg. He died in 1170. His elder grandson, Otho II., ceded considerable territories to the ecclesiastical dominion of Magdeburg, but the younger, Albert II. (1206-1221), again enlarged Brandenburg. The same was done by his sons, John I. and Otho III., who after a united reign of nearly 40 years divided the marks, Stendal and Salzwedel becoming their capitals. John, the founder of the elder line, was the first to assume the dignity of elector. Among his successors was Waldemar (1308-1319), a warlike prince. His line became extinct in 1320, the younger three years earlier. A period of distraction and decay followed, during which Brandenburg came into the possession of the house of Bavaria, was disputed by a pseudo-Waldemar, and finally acquired by the house of Luxemburg, the emperor Charles IV. bestowing it successively on his sons Wenceslas and Sigismund. The last named, on his election as emperor in 1411, appointed Frederick of Hohenzollern, burgrave of Nuremberg and ancestor of the royal line of Prussia, administrator of Brandenburg, in 1415 made him elector, and on April 18, 1417,

the new elector was solemnly inaugurated at Constance. (See HOHENZOLLEHN, and PRUSSIA.) II. A town of the above described province, in the district of Potsdam, on both sides of the Havel, 35 m. W. S. W. of Berlin; pop. in 1871, 25,828. It has a cathedral of the 14th century, situated on an island in the river, a castle, gymnasium, council house, several schools and churches, a public library, a theatre, and hospitals. There are several breweries, and manufactories of woollens, linens, hosiery, paper, hats, leather, &c. The trade is considerable. The railroad from Berlin to Magdeburg crosses the town. The name both of the town and the province is derived from Brennibor or Branibor (forest castle), the Slavic name of the old castle conquered by Henry the Fowler.

BRANDIS, Christian August, a German philosopher, born at Hildesheim, Feb. 13, 1790, died in Bonn, July 24, 1867. He studied at Kiel and Göttingen, and lectured at the university of Copenhagen. In 1816 he removed to Berlin, whence he went to Rome as secretary of legation to Niebuhr. He soon returned to Berlin, and was associated with Immanuel Bekker in editing the works of Aristotle. In 1821 he was appointed professor of philosophy at Bonn. From 1837 to 1840 he was cabinet councillor in Greece, and on his return resumed his professorship at Bonn, and published *Mittheilungen über Griechenland* (Leipsic, 1842). His principal works are the *Handbuch der Geschichte der griechisch-römischen Philosophie* (3 vols., Berlin, 1835-'65), and *Geschichte der Entwicklungen der griechischen Philosophie und ihre Nachwirkungen im römischen Reiche* (2 vols., 1862-'4).

BRANDY (Ger. *Branntwein*, burnt wine), a spirit distilled from wine, the fermented juice of the grape, and in the United States from the fermented juice of other fruits, as the cherry, apple, pear, and peach. In the north of Europe the name is also applied to a spirit distilled from grain. The peculiar taste and aroma of wine brandy are due to a volatile oil derived from the husk of the grape. Rectification by repeated distillation clears the liquor of this fragrant substance, as also of its water, and converts it into alcohol. The average proportion of the latter in brandy varies from 48 to 54 per cent. The essential oil, when distilled from the husk alone, is so powerful that a few drops of it are sufficient to taint a large cask of spirit. Besides these ingredients, brandy contains coloring matter, tannin, ænanthic ether, and a little acetic ether. Cider, peach, perry, cherry, and other brandies, only differ from each other and from wine brandy by their peculiar volatile oils, which they contain in very small quantity. Brandies are commonly known as pale or dark. When first distilled, the liquor is without color, and the pale amber tint it acquires is derived from the wood of the cask in which it is kept. This becomes deeper by age, and to imitate it burnt sugar is added to the newly distilled brandy. The best brandies come from France, the most

esteemed being those of Cognac and Armagnac. They are usually rectified by the manufacturers to a specific gravity of only 0.935 to 0.922, and therefore contain more than half their weight of water, and are highly charged with the fragrant essential oil of the grape skin. Sometimes, to save expense of carriage, the liquor is more highly distilled; but this deteriorates it by causing a loss of much of the volatile fragrant oil. As the value of these brandies is greatly increased in consequence of partial failures of the vintage, and the largely increased demand, it has become an object to adulterate them, so that pure French brandy is now hardly to be obtained. Common whiskey is exported from the United States to France in large quantities, and is brought back converted into a factitious brandy. Brandy is also produced from a variety of other ardent spirits. Rum, beet-root spirit, and that of potatoes, are largely used in France for its manufacture, and similar processes are also carried on in this country. From the immense quantities of pure spirits imported into France, and the small quantity exported, except in the shape of brandy and wine, it follows that a great proportion of these are nothing more than grain or beet-distilled liquor, colored, flavored, and named to suit the market to which it is sent. The inferior spirits are carefully rectified by repeated distillations over freshly burnt charcoal and quicklime, to deprive them of their peculiar flavors, which would if left behind betray the imposition; and the essential oils are then added, which have the odor of the ether it is desired to imitate. Dr. Ure gives a recipe for manufacturing factitious brandy, which he says is free from the deleterious drugs too often used to disguise and increase the intoxicating power of British brandies, and which may be reckoned as wholesome as alcohol in any shape can ever be. To pure alcohol diluted to the proof pitch, from half a pound to a pound of argol dissolved in water is added, and with this a little acetic ether, also some French wine vinegar, bruised French plums, and flavor stuff from Cognac, which is the muck or refuse skins and pips of the grape left after the fermentation of the wine. It contains the less volatile ingredients of the grape, as the salts and most of the water—the alcohol having distilled over. It is largely imported into England to redistil with molasses for manufacturing the article known as "British brandy." The mixture is then distilled over a gentle fire in an alembic furnished with an agitator. Nicely burnt sugar (caramel) is added to the spirit which comes over, to give the dark red tint of age, and a few drops of tincture of catechu or oak bark give the astringent taste and property of the tannin contained in the real brandy. The imitations of brandy so far produced are not so perfect but that they may be easily detected.—The brandy sold in France is generally of two strengths, designated as *à preuve de Hollande* and *à*

preuve d'huile, the former varying from 18° to 20° Baumé. The value of the stronger liquors depends upon the quantity of water that may be added to them to give them the strength of *eau de vie à preuve de Hollande*. There are usually twelve grades, designated as five-six, four-five, three-four, two-three, three-five, four-seven, five-nine, six-eleven, three-six, three-seven, three-eight, and three-nine. These terms indicate the relative proportions of spirit and water required to produce the Holland proof. The spirit five-six has a specific gravity of 0.9237 or 22° Baumé. On an average, 1,000 gallons of wine yield on distillation from 100 to 150 gallons of brandy.

BRANDYWINE CREEK, a stream which rises in the N. W. part of Chester co., Penn., flows through the interior in a S. E. direction, and empties into Christiana creek at the city of Wilmington, Del. It furnishes power throughout its course for many valuable mill seats. On its banks the Americans, 13,000 strong, under Washington, were defeated by the British, 18,000 strong, under Howe, Sept. 11, 1777.

BRANECKI, or **Branicki**, **Franczek Xawery**, a Polish statesman, died in 1819. He was born of an obscure family, most probably of Tartar origin, and served in the military household of Jan Klemens Branicki. In 1762 he was an attendant of Poniatowski at his visit to St. Petersburg, and the abettor of his amours with Catharine II. When his master became king, Branecki was rapidly advanced through the influence of Catharine, and in 1771 became grand constable. In 1778 he was foremost in facilitating and sanctioning the first dismemberment of Poland. Afterward he was active in forming the confederacy of Targovitz in 1792, which resulted in the second dismemberment. In 1794 he was proclaimed a traitor to his country. After the third and final division of Poland in 1795, he retired with his wife, a niece of the celebrated Potemkin, to the immense estates given him by Catharine in the Ukraine, where he died. His descendants are among the richest proprietors in Russia. They received the title of counts in 1841.

BRANICKI, **Jan Klemens**, a Polish statesman, born in 1688, died Oct. 9, 1771. In his youth he served in the French army. About 1715 he returned to Poland, where he rose to the highest dignities, and was an opponent of King Augustus II. and the zealous champion of the nobility. After the death of Augustus III. he officiated as grand constable and first senator of the kingdom, and stood at the head of the republican party. He was offered the crown by a great majority of the nobles; but, backed by Russia, Poniatowski was elected, while Branicki was outlawed, and escaped to Hungary. The new king, however, who was his brother-in-law, soon recalled him, and restored him to his dignities. He was called by the nation the last patriot, and at his funeral was performed for the last time the mediæval ceremony of the ancient chivalry, that of breaking

the coat of arms, and entombing it with the body of the last member of a noble line.

BRANT, a S. W. county of Ontario, Canada, drained by Grand river and traversed by the Great Western and the Buffalo and Lake Huron railways; area, 416 sq. m.; pop. in 1871, 33,269. The surface is somewhat diversified, but most of it is level. The soil is exceedingly fertile. Capital, Brantford.

BRANT, **Joseph** (**THAYENDANEGA**), a Mohawk chief, born in Ohio about 1742, died on his estate at the head of Lake Ontario, Canada, Nov. 24, 1807. Having taken a part in the campaign of Lake George in 1755, and in various subsequent conflicts, he officiated after Sir William Johnson's death as secretary of Col. Guy Johnson, superintendent general of the Indians; and when the American revolution began he was instrumental in exciting the Indians against the colonies. He took part in the massacre of Cherry Valley, and in other sanguinary affairs. He had been sent about 1760 to Dr. Wheelock's Indian school in Connecticut, and in 1775-'6 he visited England. He was received with great distinction on a second visit to that country in 1786, and was afterward attached to the military service of Sir Guy Carleton in Canada. He opposed the confederation of the Indians which led to the expedition of Gen. Wayne, and exerted himself to preserve peace between the Indians and the United States. He was, however, zealously devoted to the welfare of his own people, and conspicuous for his efforts to prevent the introduction of ardent spirits among them. During his stay in England he collected funds for a church, and published the "Book of Common Prayer" and the Gospel of Mark in Mohawk and English. One of his sons in 1811 and 1812 led a body of Canadians and Indians employed by Great Britain against the United States. The "Life of Joseph Brant," by W. L. Stone (1880), has passed through many editions; the latest, New York, 1865.

BRANTFORD, a town of Canada, province of Ontario, capital of the county of Brant, W. of Lake Ontario, 60 m. S. W. of Toronto, and 75 m. N. W. of Buffalo; pop. in 1871, 8,107. It occupies a commanding position on the banks of the Grand river. The county buildings were erected at a cost of \$40,000. It has an excellent system of water works, constructed at a moderate cost, and is well lighted with gas. Several branches of manufacture employ a large number of persons. Among them are engine works, founderies, and manufactories of agricultural implements. There are ten churches, and a widows' and an orphans' home. Situated on the Goderich and Buffalo railway, its facilities of access to all points east and west are excellent. Until 1830 the town plot was a reserve of the Six Nations.

BRANT GOOSE. See **GOOSE**.

BRANTÔME, **Pierre Bourdellies**, seigneur de l'abbaye de, a French historian, born between 1527 and 1540, died July 5, 1614. Familiar

with military life at the headquarters of François de Lorraine, second duke de Guise, and on various battle fields where he showed prowess, he had many opportunities of becoming acquainted with the events of the 16th century; and his field of observation was greatly enlarged by extensive travels and by his relations with the court and with literary and general society. He was gentleman in ordinary to Charles IX., shortly after whose death (1574) he retired from the court, after having been for a time chamberlain of Henry III., by whom he was less appreciated than by Charles. He was particularly disappointed at the time of the death of his elder brother André (1582), when Henry made the latter's son-in-law seneschal of Périgord, instead of investing Brantôme with this office, which up to that period had been hereditary in the Bourdeilles family. In his exasperation he proposed to take service against France with Philip II. of Spain; but he speedily returned home on hearing of the outbreak of civil war, and henceforth lived with his brother's widow and children, preparing works which were published after his death. His writings are pervaded by a cynical and frivolous spirit, but his style is lucid and attractive, and his acute observations throw much light upon the leading persons and events of his day. The first editions of the *Mémoires de Pierre Bourdeilles, seigneur de Brantôme*, appeared in Leyden (10 vols. 12mo, 1666-'7 and 1699), afterward several times reprinted elsewhere (German translation by Alvensleben, 2 vols., Grimma, 1851). Besides his *Mémoires*, he wrote *Vies des hommes illustres et des grands capitaines français et étrangers*; the entertaining *Dames illustres et dames galantes*; and *Anecdotes touchant les duels*. Collective editions were published at the Hague (15 vols. 12mo, 1740), and Paris (8 vols. 8vo, 1787). A new edition was included in Petitot's *Mémoires relatives à l'histoire de France*, with annotations by L. J. N. de Monmerqué (1823), after original MSS. in the national library revised by Brantôme himself. Among the biographers of Brantôme, besides Monmerqué, are Mérimée and Lacour (Paris, 1858 *et seq.*).—Brantôme had three brothers and two sisters, the most eminent of whom, especially as a soldier and diplomatist, was the viscount André de Bourdeilles, privy councillor of the king and seneschal and governor of Périgord from 1572 till his death in 1582. His life, military writings, and correspondence with Charles IX., Catharine de' Medici, and Henry III., fill the 8th volume of Monmerqué's edition of Brantôme's works.

BRAOUÉZEC, I. E., a French explorer, born at Morlaix, Oct. 29, 1828, died April 3, 1870. Stationed on the W. coast of Africa as a naval commander, he examined in 1858-'9 the Gaboon, Senegal, and other rivers, and wrote *Notes sur les peuplades riveraines du Gabon, de ses affluents et du fleuve Ogo-uevai*, and memoirs on various African explorations. He died after

his return to France from the effects of the African climate.

BRASCASSAT, Jacques Raymond, a French painter, born in Bordeaux, Aug. 30, 1805. In 1825 he gained the second prize at the school of fine arts for a historical landscape illustrating the hunt of Meleager, and subsequently travelled and studied five years in Italy at the expense of the duchess de Berri. For many years he has been a regular contributor to the annual expositions in Paris, and is noted for his animal pieces. He is a member of the academy of fine arts, and has several times received a first medal. His chief works comprise "Bulls Fighting," in the museum of Nantes, "Cow attacked by Wolves and defended by a Bull," "Bull Butting against a Tree," and pictures of dogs, sheep, cattle, and wolves, which usually have a background of wooded landscape.

BRASIDAS, a Spartan leader in the Peloponnesian war, died in 422 B. C. He is first mentioned in history in connection with the successor of Methone (481 B. C.), with a handful of men and by his personal bravery, from a powerful attack by the Athenians. This exploit gained him the first public honors conferred by the Spartans during the war. In 429 he was sent as one of three counsellors to Cnemus, after his defeat by Phormio. With Cnemus he made an unsuccessful plan to surprise the Piræus; the reason of the failure is not satisfactorily explained by the historians. In 427 he served with Alcidas, the Spartan admiral, and in 425 he led the attempt to drive Demosthenes, the Athenian leader, from Pylos. In 424, while he was preparing for an expedition to Chalcidice, Megara was suddenly attacked, and he promptly effected its relief. Shortly afterward, being sent against the Athenians in Thrace, he conducted a rapid and skilful march across the hostile country of Thessaly, assisted Perdiccas the Macedonian against a neighboring enemy, Arrhibæus, and then marched upon Acanthus, which, as well as Stagira and Argilus, he persuaded to revolt from Athens. Amphipolis, surprised by a quick march, surrendered to him, and before the end of a year Brasidas had either by arms or persuasion gained the accession of nearly every town in that district. At Torone and Lecythus he encountered the chief resistance. In 423, after suppressing revolts in Scione and Mende, he undertook another expedition with Perdiccas against Arrhibæus; it was unsuccessful, but Brasidas made a masterly retreat. While this was going on the Athenians recaptured Mende and held it. In 422 Cleon brought a large Athenian army against Amphipolis, where the Spartans had their chief garrison; the cities around surrendered, leaving Brasidas exposed with his small force to greatly superior numbers. Seeing that the only hope of the city lay in a sally against the besiegers, the Spartan leader marched his men out of the place, and engaged the enemy with such success as to secure a complete victory. Cleon

was killed, but Brasidas himself was mortally wounded, and died soon after. He was buried with extraordinary honors by the Spartans at Amphipolis, and yearly sacrifices were long offered to him there.

BRASS. Of all the alloys of one metal with another, none are more useful than those of copper with zinc, forming the different varieties of brass. This alloy appears to have been in use at a very early period, if the Latin word *æs* is correctly translated brass instead of copper; for Lucretius observes, *Et prior erat æris quam ferri cognitus usus*—"The use of brass was known before that of iron." Pliny speaks of its use soon after Rome was founded, and states that Numa, the successor of Romulus, formed the workers of it into a kind of community. It is also certain that before zinc was ever obtained as a distinct metal, its alloy with copper was in use, the zinc ores being reduced in process of making the alloy by the charcoal mixed with them; when thus formed, the metallic zinc is absorbed in the copper placed in the crucible, without once appearing in its own form. Brass continued to be manufactured in this manner till the year 1781, when James Emerson obtained a patent for making it by direct fusion of its metallic elements. His method, which is still employed, is to melt the metallic zinc and introduce the copper in thin slips. When enough is added to render the alloy difficult of fusion, the heat is increased and the additional copper required is introduced in a melted state. Another process is to melt the copper first and introduce the zinc with iron tongs; but at the present time brass is usually made by placing the copper and zinc in alternate layers in fire-clay or graphite crucibles, and smelting them under a thick layer of charcoal. When the fusion is complete the alloy is cast into granite moulds luted with clay. Owing to the uncertain quantity of zinc which escapes in consequence of the high melting point of copper, which is above 2,200° F. (Daniel, 2,548°), while that of zinc is only about 770°, it is difficult to exactly preserve the proportions of the two metals. Old brass is often used, which also complicates the estimation of the relative quantities of the constituents. From these causes the exact composition is never known except from analysis. The best proportions to make fine brass are two equivalents of copper, $31.7 \times 2 = 63.4$, and one equivalent of zinc, 32.5; or in 100 parts, 66.11 of copper to 33.89 of zinc. The usual practice is to mix two parts of copper, by weight, with one of zinc. The quality of brass, in regard to its ductility, malleability, and tenacity, varies much according to the proportions of its ingredients. In certain proportions it is more ductile at ordinary temperatures than pure copper, but it is generally brittle at a red heat. The most ductile of all the alloys of copper and zinc are those containing 84.5 per cent. of copper and 15.5 of zinc, called tombac, and brass which contains 71.5 per cent. of copper

and 28.5 of zinc; but in this latter proportion it is not malleable while hot, and articles made of it must be cast. An alloy prepared of 60 parts of copper and 40 of zinc has a fine close-grained fracture and greater density than common brass, and when hot can be rolled into thin sheets. This is known as Muntz's metal, a patent having been obtained for it by Mr. G. B. Muntz of Birmingham in 1832. It has to a great extent superseded copper for sheathing ships, and possesses the advantages of keeping the bottoms cleaner and of being less expensive. The addition of one or two per cent. of lead to brass improves its quality for being worked with tools, but impairs its toughness by diminishing its adhesiveness. Bath metal, Prince's metal, tombac, pinchbeck, Mannheim gold, and other alloys resembling inferior jeweller's gold, contain 80 per cent. or more of copper; and on account of the expensiveness of tin, have been much used as substitutes for bronze. Oreide is the name given by Meurier and Valient of Paris to an alloy of golden brilliancy. It is prepared by fusing 100 parts of copper, by weight, and adding 6 parts of magnesia, 3.6 parts of sal ammoniac, 1.8 part of quicklime, and 9 parts of crude tartar gradually, and stirring for about half an hour. Seventeen parts of zinc are then added, and after stirring, the crucible is covered and kept hot for about 35 minutes. It is then uncovered, and the alloy carefully skimmed and cast into a metal or moist sand mould. It has a fine grain, is malleable, takes a brilliant polish, and may have its complexion restored by acidulated water. Corinthian brass was an alloy of gold, silver, and copper. In the following table of the composition of various alloys of copper and zinc used in the arts, taken from Watts's "Dictionary of Chemistry," it will be observed that some specimens contain small portions of tin and lead, in some cases enough of the former to approach the character of bronze:

ALLOYS.	Copper.	Zinc.	Tin.	Lead.
English brass.....	70.29	29.26	0.17	0.28
Brass from Augsburg.....	71.89	27.68	0.85	..
" " Romilly.....	70.10	29.90	..	..
Ship nails—bad.....	62.78	41.18	..	4.73
" " good.....	62.62	24.64	2.64	8.69
English tombac.....	96.88	18.61	..	..
German ".....	64.00	15.50	..	..
Coin of Titus Claudius.....	81.40	18.60	..	..
" Nero, A. D. 60.....	81.07	17.81	1.05	..
" Titus, A. D. 79.....	88.04	15.84	..	..
Antique bracelet, Naumburg.....	88.08	18.38	1.54	..
Antique chain, Ronneburg.....	82.50	17.50	..	..
Statue of Louis XIV.....	91.45	5.58	1.70	1.87
" Henry IV.....	89.62	5.70	4.20	0.48
" Louis XV.....	82.45	10.30	4.10	..
" Napoleon.....	75.00	20.00	8.00	2.00

If copper sheets are exposed at a red heat to the vapors of zinc, they are completely penetrated by them and converted to brass. Lyons gold lace is made by thus exposing copper rods to the vapor of zinc until the surface is converted to brass, and then drawing them out into wire. If a copper coin is placed in a crucible above a

mixture of zinc oxide and charcoal, and heated, it will become brass without obliteration of the device.—Brass is much used for the bearings of machinery; for making the reeds of wind musical instruments, for those parts of machinery where iron would be objectionable or where ornamentation is desired, for various kinds of tubing, for tacks, bolts, and screws, and for optical and other instruments of like construction.—Brass solder is usually composed of two parts of brass to one of zinc, but the proportions may be made according to the desired degree of fusibility, which property is almost in exact proportion to that of the zinc used. (See BRAZING.)

BRASSEUR DE BOURBOURG, Charles Étienne, abbé, a French traveller and archæologist, born at Bourbourg, near Dunkirk, Sept. 8, 1814. He studied theology at the university of Ghent, was ordained at Rome in 1845, became professor of ecclesiastical history at the Roman Catholic seminary of Quebec, and in 1846 was appointed vicar general at Boston. With the exception of intervals employed in visiting Rome and Paris, he was from 1848 to 1863 almost uninterruptedly engaged in exploring the United States, Mexico, and Central America, acting sometimes as chaplain of the French embassy in Mexico and as teacher of Indians in Guatemala. In 1864 he went to Mexico as archæologist of the French scientific expedition. His principal works are: *Histoire du Canada, de son église, &c.* (2 vols., 1852); *Histoire des nations civilisées du Mexique et de l'Amérique Centrale avant Christophe Colomb* (4 vols., 1857-'9); and *Collection de documents dans les langues indigènes pour servir à l'étude de l'histoire et de la philologie de l'Amérique ancienne* (3 vols., 1861-'4). The third volume, relating to Yucatan, was republished in 1864 under the title of *S'il existe des sources de l'histoire primitive du Mexique dans les monuments égyptiens, et de l'histoire primitive de l'ancien monde dans les monuments américains*. His illustrated work, *Monuments anciens du Mexique, &c.*, was published in 1864-'6 under the auspices of the French government. A second edition of his youthful novel, *La dernière vestale*, was published in 1853, and of *Le khalife du Bagdad* in 1859. The *Bulletin* of the French geographical society (March, 1864) contains his letter from Spain (November, 1863) to M. de Quatrefages announcing his discovery in the archives of Madrid, after many years of research, of the alphabets of the inscriptions on the Central American monuments. These alphabets are phonetic, and by aid of the *Codex Mexicanus* and the library of Dresden he claims to have deciphered several words. He has recently published a catalogue of a part of his collection of early grammars and vocabularies of Aztec languages.

BRASSEY, Thomas, an English railway contractor, born at Boughton, Cheshire, in 1805, died Dec. 8, 1870. His first railway enterprise was the construction of a Welsh road.

In 1836 he made a contract for a small portion of the line between Birmingham and Liverpool, a part of the London and Northwestern railway, and was subsequently widely engaged in similar enterprises both in England and abroad. In several of these he was associated with Sir Morton Peto and others. His sons, T. Brassey and J. H. A. Brassey, represent Hastings and Sandwich in the house of commons (1873). He is said to have left to his family about £6,000,000, besides extensive landed property. His biography by Arthur Helps was published in 1872.

BRATTLE, Thomas, an American merchant, born in Boston, Sept. 5, 1657, died there, May 18, 1713. He graduated at Harvard college in 1676, and was afterward treasurer of that institution. There is preserved in the "Historical Collections" a letter by him, containing an excellent account of the witchcraft delusion in 1692. Several of his communications on astronomical subjects were published in the "Philosophical Transactions."

BRATTLEBORO, a post town of Windham co., Vt., on the W. bank of the Connecticut river, about 100 m. S. of Montpelier and 96 m. W. of Boston; pop. in 1870, 4,933. The first settlement of the state was made here in 1724, when a military post called Fort Dummer was erected on a spot now known as "Dummer's meadows." The town contains an East and West village. The West village, on Whetstone creek, is devoted principally to agriculture. The East village is situated on the Connecticut river at the mouth of Whetstone creek, and on the Connecticut River railroad. A covered bridge across the Connecticut river connects it with Hinsdale, in New Hampshire. It is one of the wealthiest villages in the state. In 1836 an asylum for the insane, endowed with \$10,000 by Mrs. Anna Marsh, and still further enriched with appropriations by the state, was opened at a short distance N. W. of the village. The Brattleboro typographic company, established in 1836, with a capital of \$150,000, had a paper mill and an extensive printing house, but ceased operations about 1842. There are three hotels, a female seminary, several churches, and two water-cure establishments. Two weekly papers and two monthly periodicals are published in the town.

BRAUN, August Emil, a German archæologist, born at Gotha, April 19, 1809, died in Rome, Sept. 12, 1856. For more than 23 years he was secretary of the archæological institute at Rome. His last productions were: *Die Griechische Götterlehre* (Gotha, 1850-'54); *Die Vorschule der Kunst-Mythologie* (Gotha, 1854, with 100 plates; English translation by Grant, Gotha, 1856); and his guide book entitled *Die Ruinen und Museen Roms* (Brunswick, 1854; translated into English in 1855).

BRAUN, Johann Wilhelm Joseph, a German theologian, born near Düren, Prussia, April 27, 1801, died in Bonn, Sept. 30, 1863. He was ordained at Vienna in 1825, completed his

studies at Rome, and became professor in the university of Bonn in 1827. In conjunction with Hermes and Droste-Hülshoff, he founded *Die Zeitschrift für Philosophie und katholische Theologie*. In 1835 Hermes's lectures were suspended by order of the Vatican, and in 1837 Braun proceeded to Rome; but his efforts to change the decision of the pope were not successful, and in 1843 he was himself compelled to relinquish his professorship. In 1848 he became a member of the Frankfurt parliament, and in 1850 of the first chamber of the Prussian diet. He was the author of a number of works, theological, literary, and political.

BRAUNSBURG, a town of Prussia, in the district and 84 m. S. W. of Königsberg, on the Passarge, near the Frische Haff; pop. in 1871, 10,471. It was formerly the seat of the bishops of Ermeland. It has an ancient castle, a Roman Catholic lyceum, theological and philosophical faculty, a Catholic gymnasium, and several churches.

BRAUWER, or **Brouwer**, **Adrian**, a Dutch painter, born at Haarlem, or at Oudenarde in East Flanders, in 1608, died in Antwerp in 1640. He first made designs of flowers and birds, which were stitched upon caps and bonnets sold to the peasants by his mother. Francis Hals, a painter of Haarlem, happening to see some of these, invited the young artist to receive instruction at his house, where he kept him hard at work in a garret, and appropriated to himself the proceeds of his pictures. Here Brauwer remained for many months, ignorant of the estimation in which his talent was held abroad, until by the assistance of his fellow pupil, Adrian Ostade, he was enabled to escape to Amsterdam, where he led a dissipated life and painted only when impelled by necessity. During the wars with Spain he started on a journey to Antwerp, but, being unprovided with a passport, he was imprisoned as a spy. The prince of Aremberg, a fellow prisoner, recognizing his talent, induced him to paint something. The subject was a group of soldiers playing at cards, which the artist sketched from his prison window; and the picture being shown to Rubens, he at once pronounced it a work of Brauwer, whose release he immediately procured, and whom he received as an inmate into his house. Brauwer's longing for his old life, however, soon induced him to leave his protector, and after a brief career of dissipation he died in a public hospital.

BRAVO, **Nicolas**, a Mexican soldier and statesman, born at Chilpancingo about 1790, died there, April 22, 1854. He took part in the first revolution in 1810, and served in all the actions till 1814. Having joined Minas's party in 1817, he was imprisoned in Mexico till 1820. He was a zealous supporter of Iturbide, and became a member of the regency which exercised the supreme power for 40 days in 1822; but he contributed to the deposition of the emperor in 1823, and was a member of the provisional government till 1824. In December, 1827, he

headed a revolt against President Bustamante, he being at the time vice president himself, which office he held till April, 1829. In 1830 he commanded against the insurgents under Guerrero, who was captured and executed by Bravo's order, Feb. 17, 1831. In 1839 he became president of the council, and in 1842-'3 held the supreme power for a few months as substitute of Santa Anna, absent with the army; and he was again temporary president from July 29 to Aug. 4, 1846, when he was deposed by a revolution. During the war with the United States he participated in the battle of Cerro Gordo; and toward the end of 1853, being accused by Santa Anna's ministry of having secretly joined the insurrection headed by Juan Alvarez, he denied the accusation and retired from public life. His death was sudden, and attended by suspicious circumstances.

BRAVO MURILLO, **Juan**, a Spanish statesman, born at Frejenal de la Sierra in 1808. He studied theology, and afterward law, and began to practise in 1825. He was fiscal at Cáceres from 1833 to 1835. In 1836 he founded at Madrid the *Boletín de Jurisprudencia*, the first law journal in Spain, and edited for the moderados *El Porvenir*, and in 1837 *El Piloto*. He became an influential member of the cortes in 1837, and upon the revolution of 1841 was proscribed and fled to France. He returned in 1843, but confined himself to his profession. In 1847 he entered the ministry of Narvaez, and when the latter resigned in 1850 took his place as prime minister, holding it as an extreme absolutist till 1852. He again had to fly after the revolution of 1854, but was recalled by the counter revolution of 1856. He has since held important diplomatic positions.

BRAXTON, a central county of West Virginia; area, 646 sq. m.; pop. in 1870, 6,480, of whom 87 were colored. The surface is hilly, and covered with large forests. The soil is well watered, and generally fertile. The Elk, Little Kanawha, and Holly are the principal rivers. Coal is found in several places, and in the northern part are salt springs. The chief productions in 1870 were 20,019 bushels of wheat, 130,690 of corn, 29,908 of oats, and 1,951 tons of hay. There were 1,558 horses, 2,049 milch cows, 2,105 other cattle, 9,928 sheep, and 6,513 swine. Capital, Sutton.

BRAXTON, **Carter**, a signer of the Declaration of Independence, born at Newington, King and Queen co., Va., Sept. 10, 1736, died Oct. 10, 1797. He inherited several plantations, and in early life resided some years in England. In 1765 he took an active part in the session of the house of burgesses of Virginia, in which the resolutions of Patrick Henry were adopted, and in the subsequent assemblies which were dissolved by the governor. On Dec. 15, 1775, he was elected delegate to the continental congress, as successor of Peyton Randolph. He did not remain long in congress, but served in the legislature of Virginia till 1786, when he became one of the executive council.

BRAY, a small parish of Berkshire, England, 28 m. W. of London. A clergyman who held the vicarage of Bray in the 16th century was a Roman Catholic in the reign of Henry VIII., became a Protestant with that monarch, and remained so during the reign of Edward VI., became a Catholic again in the reign of Mary, and turned Protestant again when Elizabeth ascended the throne of England. On being reproached with his frequent changes of principle, he made answer very wittily: "Not so, neither; for if I changed my religion, I am sure I kept true to my principle, which is to live and die the vicar of Bray!"

BRAY, *Anna Eliza* (KEMPE), an English authoress, born in Surrey about 1800. She married in 1818 Mr. Charles Stothard, an artist and antiquary, whom she accompanied in artistic excursions, and who was accidentally killed in 1821; and about 1825 she became the wife of the Rev. Edward Atkyns Bray, vicar of Tavistock. Mrs. Bray's works (of which a uniform edition in 10 vols. appeared in 1844) consist chiefly of books of travel and historical romances, many of which have been translated into German. One of her most valuable productions is on the "Borders of the Tamar and Tavy," in a series of letters addressed to Southey. Mrs. Bray has written a memoir of her first husband, and in 1851 published that of his father, the eminent artist Thomas Stothard. She has also published a life of Handel (1857), and one of her second husband, with his "Poetical Remains" (1859). Her latest productions are: "The Good St. Louis and his Times" and "The Revolt of the Protestants of the Cévennes" (1870); "Hartland Forest, a Legend of North Devon" (1871); "Joan of Arc, and the Times of Charles VII., King of France."

BRAY, *Thomas*, an English clergyman and philanthropist, born at Morton, Shropshire, in 1656, died in London, Feb. 15, 1730. Being selected by Bishop Compton "to build up the infant Anglican church in Maryland, with the title of ecclesiastical commissary, he founded in 1698 the society for propagating the gospel in foreign parts, and sailed for Maryland Dec. 16, 1699, arriving March 12, 1700. He was received with great cordiality, and the "act of religion" was adopted by the legislature as he desired. He returned to England in 1701. Under the patronage of the princess, afterward Queen Anne, he established a number of parochial libraries in America, and he set on foot through England and Wales lending libraries in every deanery, whence the neighboring clergy might borrow books, and where they might meet for mutual consultation. He also engaged in the reformation of prison abuses, the establishment of parish workhouses, and other benevolent undertakings.

BRAZIL (*Imperio do Brazil*), a country of South America, and the only empire in the new world, extending from lat. 4° 30' N. to 33° S., and from lon. 35° to 73° W. It is bounded N. by the United States of Colombia,

Venezuela, British, Dutch, and French Guiana, and the Atlantic ocean; E. by the Atlantic; S. by Uruguay, the Argentine Republic, and Paraguay; and W. by Bolivia, Peru, Ecuador, and the United States of Colombia. It thus borders upon all the South American republics except Chili. It occupies more than two fifths of the South American continent, and has, after Russia, the most extensive contiguous territory of any government on the globe. The line of demarcation at the extreme N. W. has not yet been definitively drawn; but, including the territory annexed to the empire by a recent treaty with Bolivia, it covers an area of about 3,200,000 sq. m. Its greatest breadth is 2,470 m. and its greatest length 2,600. Paraguay in 1872 ceded to Brazil, as a war indemnity, a long disputed territory comprised between the Paraguay and Paraná, N. of the Apa and Iguatim. This territory has an area of about 16,000 sq. m. The empire is divided into 20 provinces and one neutral municipality (*município neutro*), which, with their areas, estimated population in 1871, and capitals, are as follows:

PROVINCES.	Area.	Population.	Capitals.
Amazonas.....	696,700	70,000	Manáos.
Grão Pará.....	480,000	320,000	Belem.
Maranhão.....	168,000	385,000	São Luiz.
Piauhý.....	94,500	232,000	Theresina.
Ceará.....	42,634	550,000	Portaleza.
Rio Grande do Norte..	18,000	230,000	Natal.
Parahyba.....	81,500	280,000	Parahyba.
Pernambuco.....	57,583	1,250,000	Recife.
Alagoas.....	21,204	300,000	Maceió.
Sergipe.....	12,940	275,000	Araçajó.
Bahia.....	283,534	1,490,000	São Salvador.
Espírito Santo.....	14,049	65,000	Victoria.
Rio de Janeiro.....	26,600	920,000	Nitheroy.
São Paulo.....	98,547	585,000	São Paulo.
Paraná.....	72,000	90,000	Coritiba.
Santa Catharina.....	28,220	140,000	Desterro.
São Pedro.....	78,586	420,000	Porto Alegre.
Minas Geraes.....	280,000	1,450,000	Ouro Preto.
Goyaz.....	254,000	151,000	Goyaz.
Matto Grosso.....	551,575	100,000	Cuyabá.
Município Neutro.....	288	450,000	Rio de Janeiro.
Total.....	3,200,000	9,913,000	

The population of Brazil has been variously estimated at different periods, since no facilities exist for computing it with absolute accuracy, and no regular census has been taken. Some authorities set it down as high as 12,000,000, while others admit no more than 7,000,000. The foregoing table, however, is believed to present the closest approximation to truth at the present time (1873). The population of the leading cities is as follows: Bahia, 150,000; Belem or Pará, 25,000 to 40,000; Portaleza, 16,000; São Luiz de Maranhão, 30,000; Parahyba, 13,000; Recife or Pernambuco, 70,000; Porto Alegre, 22,000; Rio de Janeiro, 450,000; São Paulo, 20,000. Brazil is inhabited by an agglomeration of many races. In the northern provinces the Indian element prevails, while in Pernambuco, Bahia, Rio de Janeiro, and Minas, the negroes are numerous. In the seaports the chief part of the population is of European descent. The whites number probably one third of the entire population.

the remaining two thirds being made up of *mamelucos* or mestizos, mulattos, *cafuzos* (from Indian and negro), civilized and savage Indians, and Africans, which last form the most numerous unmixed race in the empire. The Brazilian character, with an admixture of mildness and generosity, has a disposition toward vindictiveness; and homicides from that motive are not uncommon, especially in the interior. The more educated classes, though somewhat ceremonious and proud, have remarkable suavity of manner; and as a nation the people are hospitable, gay, courteous, and communicative, quick at learning, and deeply inspired with the love of theoretical liberty. The aborigines of Brazil were a warlike, ferocious people, of the most revengeful character. Many of them were cannibals; some of them ate their enemies in grand ceremonial; others made war for the purpose of obtaining human food; and still others devoured their relatives and friends as a mark of honor and consideration. The Catauxis and other tribes on the river Purús kill and eat members of other tribes at the present day, and even preserve the flesh thus obtained by smoking and drying it. The number of aboriginal tribes found in Brazil at the time of its discovery was probably not far short of 100. They dwelt mostly in a narrow belt along the coast from N. to S., extending thence back to the Paraguay, and across the region drained by the head waters of the Plata and Amazon. Nearly all these people spoke the same language, which was however divided into numerous dialects and sub-dialects. They were called on the coast Tupí, or by some name having that word for its root; while in the interior they commonly received the name of Guaraní, to which great family they all seem to have belonged, the differences in the tribes resulting from the different situations in which they were placed, and from other accidental circumstances. They were not settled, neither were they wildly nomadic, each tribe having certain limits, where it remained until driven out by a superior force. The plantain, banana, cashew, yam, and above all the mandioca and more than 200 species of palm, furnished them food, drink, and raiment. With few exceptions the Indians of Brazil are of a bright yellowish copper color; they are robust and well made; their hair black, lank, and coarse, and the beard thin; the nose small, the lips not very thick, the face round, eyes small, and skin soft and shining. Nearly all the tribes paint their skin according to fantastical designs. Though usually grave and serious, they do not present the stolid apathy of the northern Indians; they are fond of feasts and pastimes, and are prone to excess in the use of stimulating liquors. Few of them have any definite idea of a Supreme Being, but all believe in the existence of malignant demons. Some tribes practise polygamy. The Botocudos, the most celebrated of all the tribes (see Botocudos), speak a language en-

tirely distinct from the Tupí and from that of the other coast tribes; but all the Brazilian Indians may be communicated with through the *lingua geral*, the basis of which is the Tupí-guaraní, and which was formed by the priests, traders, and slave hunters. The majority of the Indian tribes have altogether disappeared; and some of those still existing have been driven far back into the interior, where they remain in their primitive savagism. The anthropophagous tribes are chiefly confined to the banks of the Doce, Purús, and other tributaries of the Amazon. Many have, however, through the influence of the missionaries, embraced Christianity and become partially civilized, and are for the most part engaged in agriculture. The Indians being found unprofitable as slaves, recourse was had to the importation of negroes from Africa, who in earlier times were treated with unparalleled cruelty; but after the effectual suppression of the slave trade in 1850, the price of slaves became so enhanced that slave owners were impelled by self-interest to relax the severity of their treatment. The facilities for emancipation were nevertheless great; and a man's color does not in Brazil debar him from any civil or political privilege. Persons born in Brazil of African parents are called creoles. A law for the gradual abolition of slavery, passed Sept. 28, 1871, enacts that children henceforth born of slave mothers shall be of free condition, though bound to serve the owners of their mothers for a term of 21 years, as apprentices. Refusal to work for their hereditary taskmasters will be followed by severe penalties; but the apprentices, if cruelly treated, can appeal to a criminal court, which may declare them free. The same act emancipates the slaves that were the property of the government; but they are required to hire themselves out, in default of which, being under the inspection of the government for five years, they will, if found living in vagrancy, be compelled to labor in the public establishments. Large numbers of private individuals have followed the example of the crown and set their slaves at liberty; and others at their death have left them free, with portions of land for their maintenance. About 80,000 slaves were manumitted in this manner between the passing of the emancipation act and the month of December, 1872. Dom Pedro II. attempted to turn the tide of German emigration to Brazil, and a colony was formed on the Rio Grande do Sul; and after the abolition of the slave trade (1850), an act was passed offering liberal inducements to colonists, particularly as to the easy purchase of lands. Planters too entered into the colonization scheme, and by their abuses and bad faith threw discredit upon the attempts of the crown and paralyzed its efforts to people the interior. To prevent these abuses, private associations were formed in Rio de Janeiro and other cities for the purpose of redressing the wrongs of immigrants, providing them with all necessary assistance

and information on their arrival, and protecting their interests as colonists. Immigration from Europe, and chiefly from Germany and Switzerland, has of late years been still further encouraged by the imperial government, which pays a part of each immigrant's passage money. According to official reports, there were in the empire 50 colonies in 1869, with about 40,000 settlers. Many of these colonies, which are for the most part in the provinces south of Rio de Janeiro, have, in consequence of their flourishing condition, become independent of state direction. In 1871, 1,168 persons sailed from Hamburg for Brazil, over 1,000 of whom were Germans. From Jan. 1 to April, 1872, 1,105 had left the same port for the same destination.—Brazil, in shape somewhat resembling a heart, has a coast line of nearly 4,000 miles, extremely varied in its aspect and formation. From the mouth of the Oyapok to that of the Amazon, where it has an immense indentation, it is almost uniformly sandy and rather low; and from that point to the embouchure of the Parnahyba it is low, marshy, and interspersed with widely separated hills of inconsiderable elevation, and presents numerous indentations, the largest of which is that forming São Marcos bay. For about 800 m. S. of the Parnahyba the shores are at first somewhat higher, but afterward gradually sink until Cape S. Agostinhos is reached, where they are very low. Thence, save a long stretch of picturesque red cliffs, alternating with steep verdant slopes and occasional patches of sands or swampy ground, reaching from Porto Seguro to the Pirahybe in the southern portion of Bahia, they are very even, and vary but little in elevation as far S. as the bay of Espirito Santo. From this point to Cape Santa Marta the coast is broken by rocks, which attain their greatest height between Cape Frio and Santos in São Paulo. In the W. portion of the province of Rio de Janeiro it is often high, bold, very irregular in outline, and bordered by numerous rocky islands. The remainder of the coast, from Cape Santa Marta southward, is low, sandy, and intersected by numerous lakes, some of which communicate with the ocean through extensive openings. About midway between Bahia and Rio de Janeiro, and nearly 40 m. to seaward, lie the Abrolhos, four rocky islets, the principal one of which, Santa Barbara, rises to a height of 108 ft., is about three quarters of a mile in length, and is composed of beds of sandstone, shales, and trap. The beaches of these islets consist largely, and in some parts entirely, of coral and shell sand. From the Abrolhos northward to the shore of Maranhão, at very irregular and often very long intervals, are scattered true coral reefs, lying in patches at a short distance from the coast, from which they are separated by navigable channels.—Much of the Brazilian territory, probably one half, is covered by highlands and mountains; but all of these are of insignificant proportions and elevation when

compared to the giant ranges of the Andes. Indeed, many rising grounds mapped and described as *serras* have nothing of a mountainous character. The Amazon and Paraguay watershed in the province of Matto Grosso, forming the W. limit of the Brazilian highlands, is simply a low swelling plateau on which the Tapajós, Xingú, Paraguay, and other rivers have their sources; and these are so near to each other, and the watershed is so low, that canoes ascend the Tapajós from Santarém near its confluence with the Amazon, cross over, and descend the Paraguay to Villa Maria. These great river sources might easily be connected by means of a canal. All the great Brazilian ranges N. of the parallel of Diamantina and having a N. and S. direction, though commonly described as mountain chains, are, with the exception of the Serra do Grão Mogor, ranges of *chapadas* or narrow plateaus resulting from denudation. There are in the east two great parallel chains. One of these, the Serra do Mar, runs nearly in a line with the coast, lowering considerably toward the Rio Doce, and losing itself almost entirely in Bahia, about lat. 13° S. The other, situated W. of the shore chain, is the Serra de Villarica or do Espinhaço. It extends from about lat. 25° to 16° S., where it loses itself some 240 m. from the coast; but between 22° and 28° it draws so near the Serra do Mar as to be confounded with it. The Serra do Mar, much the most picturesque mountain range in the empire, follows the coast S. W. of Rio de Janeiro, traverses at variable distances from the shore the provinces of São Paulo, Santa Catharina, and Paraná, and about midway on the W. limit of that of Santa Catharina separates into two branches, one of which, under the name of Serra Geral, stretches across that province to As Torres, lat. 29° 20' S., and there turns westward, forming an elbow that trends first W., then N. W., with many curves, till, by a succession of low hills, it ultimately joins the Montes Yerbales in the Argentine Republic. The coast chain frequently changes its name; from Bahia to Rio de Janeiro it is called Serra dos Aymborés or Aimorés; in the latter province it takes the appellation of Serra dos Orgãos (Organ mountains), from a fancied resemblance to the tubes of an organ; it is next distinguished as the Serra de Paranapicaba, and lastly as the Serra Geral as above stated. The culminating point of the Serra do Mar occurs in the Organ mountains, and its height is estimated at from 7,500 to 7,800 ft. above the level of the sea. By far the loftiest mountains are W. of that chain. The Itatiaiosé, with an elevation of 10,800 ft., is the highest summit in Brazil; it is situated in the N. W. corner of the province of Rio de Janeiro, in the Serra da Mantiqueira, which separates from the Serra do Mar near the city of São Paulo, and skirts the coast for a distance much further N. than that range. In the Serra do Espinhaço are Itacolumi, 6,400 ft. above the sea; Itabira, 5,170 ft.; the Serra da Piedade, 5,770 ft.; the

Itambe, 5,903 ft.; and several others, all in Minas Geraes. On the frontiers of Minas Geraes and Goyaz is a mountain group called the Serra dos Vertentes (range of the watershed), which reaches its greatest height in the serras da Canastra, lat. $18^{\circ} 30' S.$, and da Marcella, lat. $19^{\circ} 10' S.$ This range consists of a series of spurs detached from that of the Espinhaço, stretching W. with numerous sinuosities nearly to the apex of the angle formed by the Grande and Parnahyba rivers, in Minas Geraes, lat. $19^{\circ} 40' S.$ In the S. W. extremity of Matto Grosso, and almost in the same parallel as the Vertentes, originates a chain which, under the name of Serra de Santa Barbara, forms a considerable bend down to lat. $20^{\circ} S.$ Thence it extends in a N. E. direction across the empire to the S. frontiers of Ceará; here it divides into two branches, one of which trends E. and loses itself between the provinces of Parahyba and Pernambuco before it reaches the coast, and the other, taking the name of Serra da Ibiapaba, forms to lat. $4^{\circ} 30' S.$ the boundary between Pianhy and Ceará. The whole of the range just referred to sometimes receives the name of Pyreneos; but this appellation is more properly confined to the ridge reaching from the city of Goyaz to Meia Ponte, and the highest points of which are, according to a Brazilian authority, about 9,620 ft. The Santa Marta, Santa Maria, and Tabatinga ridges, as the chain is successively called in its passage between the provinces of Minas Geraes and Goyaz, have no lofty peaks. The remainder of the chain, under the name of Serra da Borborema or dos Dous Irmãos, gradually diminishes in height until it is finally lost in the north-east. The entire range forms the watershed of the Araguaya-Tocantins, São Francisco, and Parnahyba rivers, and those of the northern tributaries of the Paranahyba-Paraná systems, and of the N. W. tributaries of the Paraguay. The Araguaya basin is studded in its entire length with low hills, whose elevation above the plain is never more than a few hundred feet. Hilly regions extend N. and W. from the great coast ranges, and traverse the provinces of Minas Geraes, Goyaz, and Matto Grosso; but they are all of inconsiderable height. The hills from which descend the Iténez-Madeira head waters are but a continuation of the low Amazon-Paraguay watershed, and terminate in elevated marshy lands on the Bolivian frontier. It has been ascertained that the summit line in Brazil is close to the coast, and not in the interior, as has been erroneously presumed by most geographers and geologists; and this summit line is the E. edge of the Brazilian highlands, which descend by a gentle slope toward the west, and terminate in the great plains or flats of the Amazon basin, most of which are subject to periodical inundations. The N. boundary of the uplands is indicated by the cataracts in the large Amazon feeders, and forms a curve having for average latitude $5^{\circ} S.$, and presenting its convex side to the north.

The S. boundary may be regarded as following the parallel of the Rio Iguazú or Iguaçu. The surface of this extensive space is roughened by innumerable hills and some mountain ranges, whose elevation above the plain is, however, as has been seen, comparatively inconsiderable. There are no known volcanoes in the empire. Burton was informed that the Itatiaiosú in the Mantiqueira was of volcanic structure; but Hartt has strong doubts as to its being a volcano. —The territory of Brazil is watered by a large number of rivers, particularly in the north and south, the former constituting the basin of the Amazon, the latter that of the Plata, or more properly the Paraguay-Paraná-Plata. The E. portion, between the basins of the São Francisco and Parnahyba, is least supplied with rivers. The Amazon enters the empire from Peru at Tabatinga under the name of Solimões or Solimoes, holds an easterly course, takes the name of the Amazon or Lower Amazon at the junction of the Rio Negro, and falls into the Atlantic almost under the equator. The area drained by the Amazon and its tributaries in Brazil is 800,000 square miles. That part of the Amazon which forms the dividing line between Ecuador and Peru varies from half a mile to a mile in width; from Tabatinga to the junction of the Madeira it gradually widens to 8 m.; after contracting to less than a mile at Obidos, where it is estimated that 550,000 cubic feet of water pass per second, it expands in the next 75 m. to over 10 m. at Santarem on the Tapajos; near the mouth of the Xingú it is 20 m. wide; and it falls into the ocean through a single mouth 180 m. wide, including the Pará. Its depth is about $85\frac{1}{2}$ fathoms at its mouth, and at São Paulo de Olivença near the Peruvian frontier; at the strait of Pauxis it reaches 254 fathoms; and the average depth is estimated at from 34 to 44 fathoms, so that vessels of any size may ascend to São Paulo throughout the year. The Solimões in all seasons navigable by large steamers 1,400 m. from the mouth of the Rio Negro; and its basin is covered with one uniform, lofty, and impervious forest. Among the tributaries to the main trunk, starting from the mouth, we find on the left bank the Anarapucú, Gurupatuba, and Trombetas descending from the mountains which separate the empire from the Guianas. The Rio Negro, by far the largest and most majestic of the Amazon feeders from the north, enters the empire in lon. $67^{\circ} 30' W.$, runs first S., then curves S. E., and, after a course of 1,200 m., pours its inky stream through two channels into the Amazon at Manáos, 1,000 m. from the ocean. The Negro is linked to the Orinoco by the natural canal Cassiquiare, navigable throughout. The Japurá or Caqueta flows almost parallel with the Ucayari-Negro, and after a course of over 1,000 m. falls into the Amazon through four mouths at the town of Ega. The Putumayo is the last large river on the left bank between the Negro and the Peruvian frontier. The

largest affluents of the Amazon come from the south. The first on the right bank, and which separates the empire from Peru, is the Javari, which it receives at Tabatinga. Next to the east is the Jutahi, which, with the Jurua, Teffé, Coary (supposed to communicate with the Jurua about lat. 9° S.), and Purús, has not yet been thoroughly explored. The Purús is believed by some to be the "Madre de Dios" of the old Spaniards, and navigable to the Bolivian frontier. The Madeira (so called from quantities of wood often seen floating down its stream), 2,000 m. long, enters the empire about lat. 11° S., and flows N. E. to its confluence with the Amazon in lon. 58° W. The Madeira rises and falls about two months earlier than the Amazon. The Tapajós rises in the Serra Diamantina, a few miles from the head waters of the Paraguay, and after a N. course of 1,100 m., navigable throughout for canoes, and for large vessels to a distance of 200 m. from its mouth, it blends its clear olive-green waters with the white turbid current of the Amazon just below the town of Santarem. The Xingú, some 300 m. longer than the Tapajós, rises in the same plateau, and runs parallel with it to the town of Boa Vista, where it joins the Amazon, here 25 m. wide. The few geographers who make the Rio Pará merely a mouth of the Amazon include in the number of the tributaries to the latter river the Tocantins, whose main branch has its head waters in the Serra de Sta. Maria, about lat. 15° S., and enters the Pará 40 m. W. of the city of Belem. The Tocantins is joined, 300 m. from its mouth, by the Araguaia, which is also a great river; indeed, it is the greater of the two, and has the longer course, and hence ought to rank as the main stream. The preceding are all the Amazon tributaries of importance. These present an unparalleled extent of inland water communication, reaching to every country in South America save Chili and Patagonia. They are divided into two classes, distinguished by the color of the respective streams, those of one class being black, those of the other class white. This difference in color is attributed to the great quantity of resinous matter held in suspension in the black-water streams, received from the coniferous trees which they carry in great numbers to the Amazon. The black waters are infested by large numbers of insects, and intermittent fevers and leprosy are more prevalent on their banks than on those of the white waters; the latter, on the other hand, are the more favorite haunts of the various large saurians. Descending the coast in a S. E. direction from the Amazon, the Parnahyba is next encountered. It rises in the Serra de Tabatinga, and after a generally N. E. course of perhaps 1,000 m. falls into the Atlantic by six mouths, at the city of its own name, in lat. 8° S., lon. 41° $45'$ W.; it has numerous small affluents, and is said to be navigable for a distance of 780 m. The São Francisco, occupying the third rank among

the rivers of South America, and the sixteenth among those of the world, takes its rise in the highlands between lat. 20° and 21° S., and flows almost due N. to lat. 12° , where it bends N. E., and falls into the ocean some 30 m. S. E. of Penêdo. In lat. 17° $11'$ $54''$ it receives the Rio das Velhas; in lat. 19° $10'$, the Pará; and about lat. 18° $49'$, the Paraopeba. The Rio das Velhas, the main branch, might by the removal of a few obstacles be made navigable by steam for 360 m. from its mouth. The bed of the São Francisco is much impeded by rapids and cataracts; otherwise the river would be navigable from the confluence of the Rio das Velhas to the sea. Steamers ply already from the Porto das Piranhas to the ocean; and Burton says that \$1,015,000 would be sufficient to open the two rivers, and construct a railway to avoid the cataracts at Paulo. Among the great southern arteries of the empire is the Paraná, formed by the united streams of the Paranahyba and Grande (which receive their head waters from the mountains of Minas Geraes), and flowing S. W. by S., constituting the boundary line between the provinces of Matto Grosso and São Paulo, and Paraná and the republic of Paraguay. The Tieté, Iguazú or Iguassú, and a host of other rivers fall into the Paraná. The Paraguay flows almost due S., separating the province of Matto Grosso from Bolivia, from lat. 20° $20'$ S., and unites with the Paraná at the S. W. corner of the republic of Paraguay to form the principal feeder of the Rio de la Plata. The Paraguay is navigable from Villa Maria. The Mearim in Maranhão, the Piranhas in Rio Grande do Norte, the Belmonte or Grande in Bahia, the Doce in Espirito Santo, the Paranapanema, separating the provinces of São Paulo and Paraná, the Jacuhy and Ibicuy in Rio Grande do Sul, the Uruguay, which separates Paraná from Rio Grande do Sul, and the latter province from the Argentine Republic, with many others, are all rivers of considerable magnitude. The Amazon and some others of the Brazilian rivers are regularly visited at their mouths by the *pororoca* or bore. (See AMAZON, and BELLM.) Most of them are subject to periodical risings during the wet season, when they overflow their banks and inundate the surrounding plains over an extensive area. The flooding of the Amazon, however, offers no impediment to navigation, inasmuch as its affluents do not all swell simultaneously, but have their risings at intervals of six months on either bank of the trunk stream. The Amazon attains its maximum height in June, 55 ft., and its minimum in December, 32½ ft. The lakes of Brazil are numerous, especially in the provinces of Pará, Maranhão, Goyaz, and along the coast, from lat. 19° S. to the southern extremity of the empire, as also in Matto Grosso. The principal are the Lagoa dos Patos (lake of the Ducks), about 150 m. long and 40 m. wide, stretching N. to S. along the coast of Rio Grande do Sul; and the Lagoa Merim, lying S. of the former,

and much smaller. Though these lakes communicate with each other and with the sea, the water of the Lagoa dos Patos is but slightly brackish, particularly in the N. portions, where its waters are constantly freshened by the influx of several large rivers. The lakes of the coast region of Rio de Janeiro are very numerous, some being several leagues in diameter, but all exceedingly shallow. Lagoa Feia, the largest, is 20 m. long; and another, called Rio Iguaçu, 15 m. Elsewhere on the coast similar lagoons are common.—For a length of at least 2,000 m. along the coast of Brazil, and certainly for a considerable space inland, solid rock, wherever it occurs, belongs to a granitic formation. The serras do Mar and da Mantiqueira are wholly composed of gneiss of an orthoclase species, varying from schistose to coarse-grained and porphyritic or homogeneous and granitic. As one proceeds westward from the coast, the gneiss becomes finer, and finally gives way to heavy beds of mica slate, or mica-schistose gneiss with bands of quartz; and this same succession is said to obtain in most other parts of the empire. Strong lithological resemblances are observed between the gneisses of Brazil, which De Beaumont affirms to be among the very oldest stratified rocks on the globe, and the Laurentian rocks of Europe and North America; and this resemblance is still more strongly marked by the absence of mica slate in both formations. The exact succession of the different members of the metamorphic series in the gold-bearing region in Minas Geraes has not yet been thoroughly worked out. The clay and talcose schists, the itacolumite, itabirite, and other associated metamorphic rocks of this section are, in the opinion of Prof. Hartt, lower palæozoic in age. Some of these rocks, which resemble the auriferous rocks of Nova Scotia, may be Devonian; they have been everywhere so metamorphosed that all trace of fossils has been obliterated. Great numbers of fossil plants of carboniferous genera occur in the empire; the coal basins lie just S. of the tropic, but within the range of the palm; they are of coast formation; and carboniferous rocks also occur in the Rio Iténez. There do not appear to be any carboniferous strata on the coast N. of Rio de Janeiro, the depression of the shore allowing the accumulation of coal beds not having extended beyond the southern provinces. A thick series of triassic red sandstone, unassociated with trap, underlies the cretaceous rocks in Sergipe, and extends over a large area. Cretaceous rocks are found along the coast from Bahia to Piahy, but none occur S. of the parallel of the Abrolhos; they are so largely covered by tertiary beds that it is difficult to estimate their extent; but it is quite probable that they underlie the tertiary deposits throughout the whole Amazon valley. They show themselves on the Aquiry, an affluent of the Purús, and have there been examined, as reported by Prof. Agassiz. The

cretaceous rocks seem to have been deposited in a shallow sea, have been very slightly disturbed, do not anywhere form remarkably high hills, and are at the Abrolhos associated with volcanic deposits. Prof. Hartt, though no fossils have been found in them, refers to the tertiary the clays and ferruginous sandstones forming the coast plains and overlying the cretaceous rocks unconformably, inasmuch as they are themselves overlaid by the drift clays that descend from the mountains and cover their glaciated surfaces. Drift occurs in Brazil, and is considered by Prof. Agassiz to be due to the agency of glacier ice.—The mineral productions of Brazil are immense; they comprise diamonds, sapphires, emeralds, euclases, rubies, topazes, aquamarines, zircon, gold, silver, copper, tin, lead, iron, and other metals. Diamonds have been found in various parts of the empire; but the great diamond region is in Minas, and extends from E. to W. between lat. 17° and 19° S., the most celebrated mines being those of the Serra do Frio. Diamond washing was formerly a monopoly of the government, but in pursuance of a recent law for the administration and working of diamond mines, these now belong exclusively to private individuals. The diamond usually occurs among the sands produced by the disintegration of the sandstone rock. Some of the largest known diamonds were found on some of the small rivers flowing into the São Francisco on the left bank, between lat. 18° and 19° S.; but search here has long since been abandoned. On one of these streams, the Abaeté, was found one of the largest diamonds of which we have any record; it weighed 188½ carats. From 1740 to 1772 the average diamond extraction per annum was 52,080 carats; but this average has since suffered an enormous annual decrease, and the total value of the diamond washings during the first 100 years, perhaps \$20,000,000 at the most liberal estimate, was far outstripped by the exportation of the single article of coffee in the year 1856, \$28,000,000. Diamonds are also met with in Paraná, near Cuyabá in Matto Grosso, and in the Patinga district in Bahia. The annual production of diamonds in this province is perhaps \$3,000,000. The export of these stones from the port of Bahia in the year 1864-'5 amounted to nearly \$760,000, and that of sugar alone to almost four times that sum. The other precious stones above enumerated occur in Minas Geraes. Garnets, though not of the finest quality, are found throughout the whole empire; and beautiful amethysts are by no means rare. The gold of Brazil occurs in the metamorphic rocks, in drift gravels and clays, and alluvial sands and gravels. The formations richest in gold are clay slates traversed by auriferous quartz lodes, itacolumite rock veined with gold-bearing quartz, and certain iron ores variously known under the names itabirite and jacutinga. The richest gold mines in the empire are situated in the vicinity of Ouro Preto, in

the province of Minas Geraes. Here the metal occurs primarily in quartz veins traversing metamorphic rocks, and is also disseminated throughout the rock in many places. The principal mines of the Morro Velho, in the valley of the Rio das Velhas, a tributary of the São Francisco, are those of Cachoeira, Bahú, and Quebra Panella. According to Phillips, the net profits of these mines for 1849 were \$190,680; for 1861, \$483,845; and for 1865, \$404,190. In 1864 there was a loss of \$78,145. These mines are worked by a British company, and yield a dividend of \$10 per share of \$75. The mines of Gongo Soco, and some others formerly very productive, have been abandoned. The gold veins in the alluvial soils of Minas Geraes are usually associated with platina and iridium, and in other mines of a different geological formation in the same province with tellurium and other minerals. In some parts of the country it is always accompanied by and at times mixed with palladium to the extent of 7 to 11 per cent. The opinion that the gold mines of Brazil are exhausted is pronounced to be false by Burton, Liais, Hartt, and other authorities. Silver almost everywhere accompanies the galenic formation. Copper abounds in Matto Grosso and in São Pedro do Rio Grande do Sul; it is likewise found in the provinces of Minas, Bahia, and Ceará, and near Villa Viçosa in Maranhão. Tin has been discovered among the sands of the river Paraopeba in Minas, and in the province of Rio de Janeiro. Galena is frequently met with, composed as follows: lead, 86½ per cent.; sulphur, 13½; and silver, from 1 to 7 parts in 10,000 of ore. It is plentiful at the sources of the river Iguapé, in the district of Iporanga, and also at Sorocaba in São Paulo, and is found in the provinces of Minas, Bahia, Parahyba do Norte, Santa Catharina, Rio de Janeiro, and Ceará. Chromate of lead is found at Cogonhas do Campo in Minas Geraes. Sulphide of zinc and traces of native carbonate of zinc occur in Ceará. Arsenic accompanies the pyrites in some gold mines, and exists in the acid state combined with iron, forming scorodite, in the province of Minas Geraes. There are in Brazil iron mines entirely free from pyrites, thus excelling even the famous mines of Danemora in Sweden. Iron works are carried on by the government at São João de Ipanêma, the product being of excellent quality. Many varieties of granite of different colors occur in various localities, suitable for building, though for this purpose the various kinds of gneiss are commonly employed. A very compact quartz suitable for pavements is likewise found. Of porphyry, the green, pink, and black varieties (the latter containing crystals of feldspar) are abundant. Saccharoidal limestone occurs in many parts of the empire, and is generally eruptive in the gneiss formation. Of this class of rock there are several beautiful varieties. The limestone of the Rio das Velhas valley is of a dark gray color, and is so sonorous that in former times

plates made of it were used as bells for the churches. The lime used in building on the coast is almost exclusively made from the *sambaguis* or enormous mounds of shells piled up centuries ago by the aborigines, or from the coral beds which abound in all the bays from the Abrolhos northward. Gypsum is found in Minas, Rio Grande do Norte, Ceará, Maranhão, and Amazonas. The various species of clays are extensively used for making bricks, and would also be very suitable for the manufacture of earthenware. There are extensive mines in Rio Grande do Sul, yielding coal with a more abundant ash than the English coals sent to Rio de Janeiro, which it resembles in appearance and general properties. Prof. Hartt says it has been used since about 1860 in the Jacuhy company's steamers, and found more economical than the English coal. A railway from the mines will carry the coal to a seaport, whence it can be taken by colliers and delivered at Montevideo in three or four days at about half the cost of delivering it at Rio de Janeiro, where nevertheless it is computed that it can be sold at about \$8 per ton. Coal also appears in São Paulo, and again in Ceará; it is supposed to exist in Piahy and Maranhão, and in the valley of the Amazon. Lignite is found in São Paulo, and peat in almost all parts of the empire. Bituminous schists are also frequently met with, some being of a turfy origin. Near the mouth of the Camamú, yellow schists have been discovered which afford by distillation a solid matter analogous to naphthaline, and a very volatile carburet of hydrogen, possessing excellent illuminating properties. Similar schists exist in Maranhão. Graphite is plentiful in Ceará. Sulphur has been detected in Rio Grande do Norte. Nitre, alum, sulphate of magnesia, sulphate of soda in the efflorescent form, and rock salt occur in most of the provinces. Common salt is extracted from the *stomopoda* which come upon the rock in the Rio Negro below the fresh water, and in the strongest part of the current. A curious efflorescence is that of chloride of soda in the gneiss of some of the mountains of Ceará.—Among the fossil remains of extinct mammals found in Brazil may be mentioned those of the mastodon, species of *macrauchenia*, *toxodon*, *chlamydotherrum*, and of the gigantic glyptodon (*hoplophorus*), mylodon, and megatherium. Among the carnivora there were wild cats and jaguars, and a species of *smilodon* (*S. neogaeus*), an immense cat-like animal with enormous knife-like canine teeth in the upper jaw, allied to the fossil European species. The *protopithecus* is the only extinct genus of monkey found. Lund encountered in the basin of the São Francisco stone implements and remains of man so buried with the remains of the extinct fauna as to leave no doubt that man was contemporaneous with it in Brazil as in Europe. Bones of an immense capybara (*hydrocharrus sulcidens*) have been met with, and of llamas and horses, which

last certainly existed in Brazil, as in North America, long before the conquest.—The climate along the coast from about lat. 24° S. to the N. limit, and in the valley of the Amazon, may be described as generally hot, though some parts are subject to sudden and violent atmospheric changes. In the valleys of the Paraná and the Uruguay, as also on the highlands, a cool and even a cold temperature prevails; and the climate of the whole empire, though for the most part moist, is in general healthy. In the north the wet season (winter) begins regularly toward the end of November, and lasts till the middle of May; during this period the rains are abundant and usually accompanied by terrific thunder and lightning, and become more and more frequent and heavy as the end of the season approaches. On the Amazon, from Belem westward, rain falls almost every afternoon. At Belem there are but 60 days out of the year without rain. The thermometer in this region ranges from 90° to 68° F., while at Rio de Janeiro the average temperature is 75°, and still lower toward the south. In the northern provinces, from June to December, the *ventos geraes* (general winds) blow steadily in the daytime from the northeast, and during the night from the east. The most common diseases are pulmonary consumption, intermittent fevers, and rheumatism. Goitre is extremely prevalent in Minas, parts of Bahia, and elsewhere, and is attributed to the saline impurities of the water. Leprosy is prevalent along the banks of the Amazon, at Rio de Janeiro, and elsewhere; it is said rarely to attack foreigners, and though generally reported to be incurable, statistics show that, in places where there are good physicians, it often yields to treatment, and permanent cures are effected.—The soil of Brazil is as varied as its climate, being in some parts amazingly fertile, and bearing almost every known species of vegetable production; while in others it is dry, arid, and unfavorable to vegetation. As a rule, the lands surrounding the large and populous cities are exceedingly rich and productive. The immense plains of the interior are for the most part covered with primeval forests, offering inexhaustible quantities of timber adapted both for solid construction and for cabinet and ornamental works. Few countries in the world contain such a quantity of vegetable matter on their surface as the valley of the Amazon; from a point about 60 m. S. E. of Tabatinga, a circle may be drawn of 1,100 m. in diameter, the whole area of which is covered with one dense mass of arboreal vegetation. Nearly 400 different species were exhibited in the *exposição internacional* at Belem in 1867; and Prof. Agassiz reports having seen at the same fair 117 different kinds of valuable woods out from a piece of land not half a mile square, many of which were dark-colored veined woods, as beautiful as mahogany or rosewood, and susceptible of a high polish. Under the name of *jacarandá* or rosewood are known

several species of wood, all very hard and compact, of a blackish red tinge. They flourish in Amazonas and the provinces N. of Rio de Janeiro generally, that of Espírito Santo being reputed of a fine quality, and forming the principal article of export from the Doce. The *itaúba* or stonewood, found in great abundance in Amazonas, Pará, Maranhão, and other northern provinces, often attains a height of 100 ft., with a trunk over 6 ft. in diameter; all the best vessels of the Amazon country are constructed of this wood, which is said to be more durable than teak. The copaiba (*copaifera Guayanensis* or *officinalis*) and the *pao Brasil* or Brazil wood, the former valuable for its oil used in medicine and the arts, and also for its timber, the latter for its celebrated coloring matter, present a marked feature in the forest vegetation. The colossal *pao d'arco* or bow wood (*tecoma speciosa*) and macaranduba (*mimusops elata*) abound in the virgin forests N. of Rio; the timber of both is exceedingly hard and extensively used in carpentry and cabinet making. From the latter is extracted by incision a whitish, sweet, savory fluid, commonly used while in the liquid state as milk in tea and coffee; after some hours it coagulates, forming a white, elastic mass resembling india rubber, when it is employed in the arts; while the bark, very rich in tannin, is much used in dyeing. The total height of these trees, stem and crown, may be estimated at from 180 to 200 ft.; the vast dome of their foliage rises above the other forest trees as does that of a cathedral above the other buildings in a city; and logs 100 ft. long squared from these trees are not uncommon at the saw mills near Belem. The growth of buttress-shaped projections around the lower part of the stems, not only of the trees just mentioned, but of most of the larger trees, is a remarkable feature of the forest; the buttresses, generally thin walls of wood, form spacious stall-like compartments, often capable of holding half a dozen persons, and serve as props to the enormous stems. Of the order of *lecythidaceae* there are some 40 species distributed among seven genera. Chief among these are the sapucaia (*lecythis Ollaria*), the fruit of which (sapucaia nuts) is closely allied to the Brazil nut, and is enclosed in a vase-like shell with a close-fitting lid, called a monkey cup, and the *Bertholletia excelsa*, a majestic tree forming whole forests, and producing the Brazil nut. The timber of these genera is especially valuable in constructions exposed to trying atmospheric action. To those already enumerated may be added the augiao, vinhatico, caixeta, sucupira, canella, pao ferro (ironwood), cedro, perobal, gongalo aloe, bacuri, jiquitibá, condurú, piquiá, bractiara, and a host of others yielding timber suitable for every purpose, besides an endless variety of fruits, resins, oils, dyes, &c. The chief ornament of the forest is the palm, which is here represented by from 300 to 400 species, all more or less useful to the aborigines, and

some even necessary to their existence. From the graceful *cocos nucifera*, with its giant pinnate leaves often 20 ft. long, the *Maximiliana regia*, jará-assú, *manicaria saccifera*, *yriartea echoriza*, *Leopoldina pulchra*, and some others, the Indian obtains food, drink, raiment, dwelling, hammocks, cordage, cooking utensils (the woody spathes of some palms standing the fire when they are filled with water), weapons, tools, fishing tackle, harpoons, implements for the chase, musical instruments, and medicines. The carnohuba palm gives wax which, mixed with tallow, makes excellent candles, and a sort of farinaceous pith much used when other food is scarce. The cocos, of which the cocoanut palm is the type, and of which about a dozen species are here known, the assai, the bacába, a single bunch of whose fruit weighs from 30 to 40 lbs., the peach palm (*pupunha*), and scores of others, all furnish delicious and wholesome fruits, and some of them refreshing beverages. The cocos yield wax, oil, sugar, starch, and materials for cloth and cordage; the leaves and shells give thatch for huts, materials for hats, hammocks, mats, baskets, and other articles; and the roots, sap, flowers, and milk afford to the Indian medicinal remedies for many of his peculiar maladies. The wood of all the palms is very good for building. One of the most beautiful members of the palm family is the mirití, with its pendent clusters of reddish fruit, and enormous spreading, fan-like leaves, cut into ribbons, one of which is a load for a man. The plume-like leaves of the jupati are often 50 ft. long, and those of the busú 30 ft. All the well known tropical fruits can generally be had in any part of the country; but the interior abounds in productions utterly unknown in the coast districts. Some of these fruits have been cultivated by the natives, such as the jabuti-púhe and camá (two species), the former resembling the apple, the latter the pear in form and size, and both containing a pulp of a delicious flavor. The fruit of the *artocarpus Braziliensis* (Gom.), or Brazilian breadfruit, sometimes a foot and a half in the largest diameter, has immense seeds which are extensively used as food. Others grow wild, as the pamá, an oblong, cherry-colored stone fruit, growing at a height of 100 feet from the ground; and the purumá-i, which tastes like wild grapes. The fatty, bitter pulp of the umarí and the wishí is eaten mixed with farina, and is very nourishing; and *mingau* (custard) of bananas, flavored with the mallet-shaped wiko—an oblong, crimson fruit, growing apparently crosswise on its stem—is a favorite dish on the Solimoens. All vegetation is much more luxuriant in the basin of the Solimoens than in that of the Lower Amazon; trees which near Belem bloom but once a year have flowers or fruit, and sometimes both, throughout the four seasons at Ega. The species of social plants are comparatively few in Brazil; those most noteworthy in the Atlantic regions are the mangroves, *conocarpus*

and *avicennia*, in addition to which and the *pteris caudata* are some species of *rhexia*, *cecropia*, and *bignonia*, together with the ubá, jaquarassú, some grasses, a bamboo, and the dwarf palm of the coast, *guriú*. The forests of the central provinces are made up of *melastoma*, conspicuous from their large purple blossoms; *bombacea*, with their peculiar foliage and large cotton fruits; candelabra trees, with a fruit resembling that of the bread tree (cultivated in Brazil), but slighter and more cylindrical; euphorbias of extraordinary size; the genera *ilex*, *laurus*, *myrtus*, *eugenia*, *jatropha*, *visinia*, *ficus*, as also the *bignonia*, *rhexia*, *lecythis*, and hundreds of other for the most part unknown species; and near the plantations and dwellings exotic tropical trees are everywhere cultivated. Luxuriant plant growth greets the eye in all directions; nowhere is a spot to be seen without plants. Numberless species of *passiflora*, *caladium*, *dracontium*, *piper*, *begonia*, and *epidendrum*, with multitudinous ferns, lichens, and mosses, bloom on every tree stem; and the mass of foliage is everywhere interlaced by parasitic vines. Countless tough, woody lianes, varying from thread-like tenuity to the thickness of a man's thigh, cling to and twine around the tree trunks, climbing to the very topmost branch, there to blossom and bear fruit above the reach of vision. The caoutchouc tree occurs chiefly between Belem and the Xingú, and on the Solimoens and Rio Negro; and the *smilax syphilitica*, valuable for the sarsaparilla extracted from its roots, abounds in the whole Amazonian forest region, from Venezuela to Bolivia. Brazilian nutmegs, Tonka beans, and Maranhão cloves are all common to the Rio Negro, in the basin of which are numberless trees rich in various kinds of oils and resins. Among the forest trees of the Amazon, the *leguminosae* are by far the most abundant in species, and also the most remarkable, from their curious bean-like fruits, commonly of immense size or length. Many of the ingis and allied genera have pods a yard long and very slender, while in others the pods are three or four inches wide and quite short. There are numerous species of vanilla; the Leopoldina palm, the fibres of whose petioles give the piassaba so extensively employed in textile fabrics, occurs in large numbers; as do also several species of *bombax*, producing silk cotton. The flowers of the forest trees in the densely wooded regions are comparatively small and inconspicuous; in the open country, or *campos*, the flower-bearing trees and bushes are more abundant, as indicated by the larger number of floral insects attracted thither; but in the more cultivated districts in the central and southern provinces, the prodigious variety and beauty of the flowers never fail to command attention and admiration. In addition to the tropical fruits alluded to above, mention should be made of the bananas, yams, figs, lemons, oranges, &c., all of which grow

in immense quantities in most of the provinces, the oranges of Pará being at once remarkable for excellence and abundance.—The zoölogy of Brazil is no less remarkable than its botany for the variety of species which it comprises. Among the animals not indigenous to the country are the horse, ass, sheep, hog, and dog. Numerous herds of horned cattle roam wild over the vast plains of the interior, and considerable numbers in a domestic state on the large plantations of the southern and central provinces. The horses compare favorably with those of other South American states; but the sheep and swine are in general of inferior breeds, though the markets of the large cities afford some excellent mutton. Wild pigs inhabit the forests and are hunted for food. Game in great variety abounds throughout the wooded region, and especially deer, hare, and squirrels. Here also are the great maneless lion (cougar or puma); the jaguar, whose strength enables it to kill a young bull and drag the carcass to the summit of a hill; the ocelot (*felis pardalis*), and two other species of *felidae*. All these the Brazilians designate by the single generic term *onça* (ounce), distinguishing them, however, into three species according to the color of the skin: the *onça preta*, *onça pintada*, and *onça de lombo preto*. Wolves, *cachorras do matto* (dogs of the woods), a species of fox, and *antias* (American tapir) are common; as are likewise sloths, *pacas* (*calogenys paca*), agoutis, and armadillos; the three last named species ranking among the most highly esteemed game of the country. Three small species of deer, the tapir, the largest quadruped in the empire, two or three species of large *felidae*, two kinds of wild hog, the capybara, and the *paca* comprise nearly all the large game of this region. Small agoutis, sloths, armadillos, and ant-eaters are common. The capybara (*hydrocharus capybara*) frequents the banks of the rivers, eats grass, and dives when pursued. Its flesh, though frequently eaten, is not very good, while that of the *paca* is particularly savory and tender. Many species of opossum occur, and are very destructive to poultry. The flesh of the armadillo, both species of which are eaten, is white and delicate. The large ant-eater is a powerful animal; the Indians assert that it sometimes kills the jaguar; and the various species of sloth are a favorite prey of the harpy eagle. Otters, the *echimys* (a kind of rat), two species of coati, porcupines, iráras or honey-eaters, water rats, and various other species of rodents are not uncommon. There are over 80 known species of monkeys in the basin of the Amazon, and probably twice that number in all Brazil; of these the *mycetes*, or howlers, are the largest; the coaitá and many other kinds are esteemed for the delicacy of their flesh. Rabbits are common in the central provinces; and vampires often cause much trouble by biting horses, cattle, and even men. Chief among the pre-

daceous birds are the king vulture and the harpy eagle, which, with a great variety of smaller eagles, hawks, kites, owls, &c., inhabit the Amazon region, and all but the first two are found in most parts of the empire. There are two other species of fine eagles inhabiting the Upper Amazon exclusively. Wallace reckons at least 80 distinct species of parrots, varying in size from the tiny *psittaculus passerinus* to the magnificent crimson macaw, and some 20 varieties of humming birds. Immense flocks of aquatic birds frequent the rivers and lakes; the American ostrich (*rhea Americana*) ranges from Ceará to the Uruguay; and there is an infinite variety of small birds, whose showy and brilliant plumage forms a gay contrast with the monotonous, never-fading verdure of Brazilian vegetation. During certain seasons of the year frigate birds, gulls, and several other species of marine birds resort in numbers to the Abrolhos. A remarkable bird is the siriemma, a sort of small ostrich, occurring in the highland deserts; it is easily tamed, and then becomes very useful for the extermination of serpents, which form its chief food. Five species of toucans inhabit the woods of Ega, all remarkable for the enormous size and light structure of their beaks, which are often two inches wide and seven long. Turkeys, geese, ducks, Guinea fowl, and other poultry are met with in every form; and wild turkeys, peacocks, wild geese, &c., are very numerous. Some travellers have spoken of a kind of lyre bird in Minas Geraes. Among the reptiles, the boa constrictor (*jibóia*), and the anaconda (*surucujá*) come first in order. Wallace says the latter is decidedly the larger of the two; but both attain to an enormous size, and it is generally believed in the country that they sometimes reach from 60 to 80 feet in length. Poisonous serpents abound, and there are numerous varieties, the most terrible of all being the jararaca; it is common in all the southern provinces, and its bite, nearly always mortal, is immediately followed by the most poignant suffering. The jararacas-sú is a larger variety of the preceding. The *cobra coral*, or coral serpent; the *cobra sipó*, or liane snake, dangerous from the grayish color of the skin, similar to that of the lianes around which it entwines itself to lie in wait for its prey; the *cobra fria*, or cold snake, whose body is frigid as ice; and the rattle-snake (*cascavel*), are all exceedingly venomous, and rarely exceed two yards in length. Three or four distinct species of alligators abound in the Amazon and all its tributaries. The smaller ones are eaten by the natives, and they in their turn are devoured by the large ones. Besides the jurará, the largest and most abundant of the Brazilian turtles, there are various other species; from their eggs, the yolks of which are very good eating, is extracted an oil much used for light and in culinary preparations. The rivers and lakes abound in fish of endless variety; in every small river, even in different parts of the same river, distinct species occur;

and it would be impossible to estimate the number of kinds in the several rivers of the empire. The garoupa is a large fish, of excellent flavor, taken in prodigious numbers off the coast between lat. 17° and 18° S. An immense variety of fish is caught in the vicinity of the Abrolhos, and used for food, comprising some of the most delicious kinds of marine fish. The *peizeboi*, or cow fish, called by the Indians *jurudá*, is an herbivorous cetacean, of which there are probably two species in the Amazon, considered as distinct from the manatee of the West Indies. In the São Francisco there is a fish called the piranha, exceedingly voracious, biting the legs of bathers, and attacking and mutilating other fish irrespective of size. The pirucú is taken in large quantities in the Amazon, and is preserved like cod. The Amazonian forests are without a rival for the great size and gorgeous colors of their butterflies, and the endless variety of the species. The *heliconii*, a group of butterflies peculiar to tropical America, are very numerous; and the harlequin beetle, with the gigantic *prioni* and *dynastes*, are also found here. Musical crickets; immense spiders, of sufficient size (some being half a foot in expanse) and strength to attack and kill finches; countless varieties of bees, some without stings, others making sour honey; satybas, or leaf-carrying ants, so abundant in some districts as to render agriculture almost impossible; formidable mosquitoes, sand flies, motucas, piums (a minute fly, the insect pest of the Upper Amazon), carnivorous beetles, huge scorpions, and myriads of other species, form the characteristic features of the Brazilian insect world.—There exist in Brazil magnificent pasture lands eminently suitable for cattle raising, and watered by great rivers affording an easy and direct highway to all the markets of the country and of the world. The meadow lands of the more southerly provinces, however, support countless herds of horned cattle, which form an important source of wealth to the country. The cultivated ground from the Rio Negro to the Andes does not exceed a few score acres. In the valley of the Tocantins the inhabitants like better to gather nuts and cacao, and make india rubber, than to apply themselves to the regular cultivation of the soil. That part of the coast region extending from Bahia to Sta. Catharina, with the exception of Espirito Santo, is generally devoted to coffee culture, though rice is an important product of Rio de Janeiro and the adjoining provinces, and there are immense sugar *fazendas* in all of them. The region embracing Rio Grande do Sul, Paraná, and Sta. Catharina yields the various cereals, cattle raising being likewise an important industry; and the great equatorial districts are characterized by the spontaneous products of the forest—barks, gums, resins, and textile substances as yet unknown in foreign markets—india rubber, sarsaparilla, cacao, vanilla, &c. Rice is easily raised in all parts of Brazil; cot-

ton yields large crops in almost all the provinces, as do also sugar and tobacco. Agricultural operations are chiefly centred upon coffee, cotton, sugar, tobacco, mandioca, the various European cereals, beans, and cacao, of which last there are extensive plantations in the provinces N. of Rio de Janeiro. The yield of sugar is still considerable, and has not materially increased or decreased since 1862, notwithstanding the preference given of late years to coffee planting in many districts. Four fifths of the coffee consumed in the United States, and over half of all that is used in the world, is of Brazilian growth. Yet Brazilian coffee is much underrated, for the reason that the finer qualities are nearly always put into market under the name of Java or Mocha, or even Martinique or Bourbon, although the yearly produce of coffee in the islands of Martinique and Guadeloupe would not be sufficient to supply the Rio de Janeiro market for a single day. Each tree is supposed to yield annually, on an average, two pounds of coffee; but some give as much as eight. Besides the provinces adjacent to Rio de Janeiro, the coffee plant flourishes in the shade of the Amazon forest, and with moderate care yields two annual crops; and the Ceará coffee, much esteemed, grows on the mountain slopes, at an elevation of from 2,000 to 3,000 ft. above the sea. In the province of Pará the coffee plant is seen growing on almost every roadside, thicket, or waste. In 1818 all the coffee exported from Brazil was only 74,800 sacks; in 1871 it was 2,358,001 sacks. The value of cotton exported increased from \$8,888,705 in 1862 to \$24,030,325 in 1866. This rapid increase was due to the civil war in the United States. Mandioca or cassava is extensively cultivated; it is said that one acre of it affords as much nutriment as six of wheat, and the farina prepared from it is a common article of food in all parts of the empire. The vine and the olive are cultivated to a limited extent in the southern provinces.—Manufactures are not yet in a very advanced condition in Brazil. Sugar refining is carried on extensively, particularly in the great cane-growing provinces of Bahia and Pernambuco, where there are numbers of *engenhos* established on a grand scale, with the best modern machinery for water or steam power. In the interior the old imperfect systems are still adhered to, owing in many cases to the apathy of the planters, but chiefly to the expense and difficulties attending transportation from the coast. Little has as yet been done in Brazil toward manufacturing this class of machinery. To the *engenhos* in the interior are commonly attached distilleries, and three kinds of rum are manufactured: *cachaça*, somewhat resembling in taste the rum of the West Indies, but inferior to that in quality, is in universal use among the lower classes, and is made from the molasses that drips from the *mascavado* or common raw sugar; *aguardente*, or the rum

of commerce, directly distilled from the cane juice; and *restilo*, the result of a second process of distillation (hence the name) of the latter, to which is previously added another ingredient. About 6,500,000 gallons of rum are annually exported. The *aguardente* is extensively used in the manufacture of gin and of fine liqueurs, a large variety of which latter, flavored with the aromatic extracts of various indigenous fruits, was exhibited in Paris in 1867. A sort of brandy is also made from *mandioca*, the fruits of the *cajueiro*, *genipapeiro*, &c. Beer breweries, of comparatively recent establishment, are in successful operation in Rio de Janeiro, Petropolis, Rio Grande do Sul, and Pernambuco; but the full development of this industry is seriously impeded by the necessity of importing from Europe the barley and hops, which might be raised in abundance in the southern provinces. Tobacco is manufactured on a large scale in some places, chiefly in Bahia and Rio de Janeiro, where are made several kinds of snuff much esteemed in foreign markets. Large quantities of cigars of a common class (*charutos*) are manufactured in Bahia and other places. In some towns and districts near Bahia the whole population is thus occupied, and the saw mills turn out from 7,000 to 8,000 cigar boxes a day. In the financial year 1859-'60 46,000,000 *charutos*, valued at \$804,667 55, were exported from Bahia; and the yearly export has since been steadily on the increase. A number of cotton-weaving factories have been established, and compete favorably with foreign manufacturers in the production of the coarser fabrics. The first cotton factory in Brazil was built by an American near Rio de Janeiro, and the workers are chiefly taken from the German colony at Petropolis. There is besides an extensive *fabrica* in the province of Bahia, also built by Americans, and employing 800 operatives of both sexes, mostly from the orphan and foundling asylums of the city. From 80,000 to 40,000 pieces (of 16 yards each) are here produced annually, and a considerable quantity of sewing cotton, nets, &c. The largest factory is in Minas Geraes, with 15,000 spindles and 400 looms; it affords constant employment to 800 hands, and is said to turn out annually 3,500,000 yards of cloth and 274,000 lbs. of yarn, of a total value of \$1,100,000. In the provinces already mentioned, and in Alagoas and elsewhere, there are other cotton factories, but of minor importance. To promote the development of this industry, the government has decreed the free entry of all machinery for that purpose, and the exemption of the operatives from military service, but appoints an inspector to superintend each establishment. Very good silks are made at Rio de Janeiro and elsewhere. There are saw mills in various parts of the country. Common and wall papers are manufactured; also soap, chemicals, braids, ribbons, bronzes, &c. Some important works have been executed in Brazilian foundries, such as steamships and iron

bridges; and the coast steamer companies have well appointed machine shops for the repair and even building of engines. The province of São Paulo has some large iron works. In the large cities there are gold and silver smiths and jewellers; but these and the artisans of the various other mechanical branches are mainly foreigners. In Brazil the exaggerated appreciation of political employment everywhere prevailing amounts to a national misfortune. Every man of liberal education seeks a political career, as being at once the easiest and most aristocratic mode of gaining a livelihood. The possession of a sugar plantation is regarded among the cultivators as a sort of nobility.—The chief article of export from Brazil is coffee, supplying, as before stated, more than half the consumption of the world. Among the other products sent in large quantities to foreign countries are cotton, sugar, cacao, hides, horns, tobacco, india rubber, diamonds, &c. The principal imports are cotton and woollen fabrics from Great Britain; wrought and unwrought iron from various countries; wines from Portugal, Spain, and France; agricultural implements, hardware, lard, flour, timber (pine), petroleum, biscuits, coal, ice, hams, soap, boots and shoes, &c., from the United States. The value of the total exports and imports for the three years 1866-'9 is shown in the following table:

YEARS.	Exports.	Imports.
1866-'67	\$78,000,000	\$71,750,000
1867-'68	\$2,650,000	70,800,000
1868-'69	101,250,000	88,850,000
Total	\$272,000,000	\$225,400,000

The entire quantities of coffee, sugar, cotton, hides, and horns exported from 1857 to 1870 inclusive, are as follows:

YEARS.	Coffee (sacks).	Sugar (boxes).	Cotton (bales).	Hides.	Horns.
1857....	2,099,780	7,817	....	81,485	318,081
1858....	1,580,488	10,620	....	61,147	283,981
1859....	2,080,266	7,785	....	81,297	333,661
1860....	2,127,219	3,235	....	57,208	314,716
1861....	2,069,627	12,335	....	79,512	170,586
1862....	1,485,220	12,518	....	70,815	115,498
1863....	1,850,109	9,722	....	68,944	258,287
1864....	1,480,184	7,136	....	85,129	180,178
1865....	1,801,959	4,622	....	90,716	119,880
1866....	1,884,896	6,042	89,198	75,608	191,288
1867....	2,547,658	6,287	70,967	70,141	116,500
1868....	2,265,185	5,185	118,123	88,709	253,544
1869....	2,564,975	3,801	40,055	85,865	147,446
1870....	2,209,456	6,540	17,910	61,507	165,909

EXPORTS TO THE UNITED STATES, FROM 1867 TO 1871 INCLUSIVE.

ARTICLES.	1867-'68.	1868-'69.	1869-'70.	1870-'71.
Cotton, lbs. ....	....	86,850	28,296	25,800
Sugar, lbs.	10,447,741	88,689,921	24,145,881	21,559,500
India rubber, lb	5,550,560	4,449,930	5,234,294	5,792,195
Coffee, lbs.	199,326,171	203,478,604	168,418,456	267,472,708
Cacao, lbs.	65,571	11,177	....	1,295
Horse hair, lbs.	586,151	978,846	741,054	923,893
Wool, lbs.	1,441,868	2,055,259	8,237,097	2,533,818

VALUE OF IMPORTS FROM THE UNITED STATES,
FROM 1867 TO 1871 INCLUSIVE.

YEARS.	U. STATES PRODUCTS.		Transhipped.	Total.
	Am. Bottoms.	For. Bottoms.		
1867-'68	\$3,025,411	\$2,619,613	\$197,859	\$5,842,883
1868-'69	2,805,297	3,106,268	158,614	6,070,079
1869-'70	2,983,191	2,719,170	110,485	5,812,846
1870-'71	3,899,099	2,546,298	148,757	6,594,154

Of the 2,209,456 sacks of coffee exported in 1870, the United States took 1,378,654. In the first half of 1871 there were shipped 1,253,656 sacks, 645,749 to the United States; and the same country took 371,266 out of a total of 625,429 sacks exported during the first half of 1872—a decrease in the total export of nearly one half. The value of the exports to Great Britain for 1870 was \$30,637,240, and of the imports \$26,834,170. The value of the British cotton manufactures imported in 1869 and 1870 was almost exactly covered by that of the raw cotton exported to the United Kingdom during the same period. From a comparison of the trade returns of several years, it is observed that one fourth of the exports go to England, and about one fifth to the United States, the remainder being divided between France, Portugal, Germany, and the Argentine Republic. The port movements in 1870 were as follows: entered, 3,540 sea-going vessels, with an aggregate of 1,486,000 tons; 4,903 coasters, tonnage 1,091,000; cleared, 3,215 sea-going vessels, tonnage 1,500,000; 4,994 coasters, tonnage 1,198,000. A line of clippers between Genoa and Rio Grande do Sul was organized in 1872, with vessels of 500 tons burden, but of light draft, to suit the bar of the latter port. The post-office receipts in 1865-'6 were \$209,902; by 1869 they had increased one-half; the expenditure for that period averaged only \$358,286 annually.—Save in the immediate neighborhood of the capital and other large cities, the want of adequate highways is still sensibly felt, and notably impedes the development of trade and industry, especially in the interior provinces. There are a few exceptions to this rule, however; and the department of agriculture and public works is devoting unremitting attention to this all-important subject. Lines of railway are fast multiplying in all the coast provinces; those already established are in process of extension, and new ones are projected. In the course of 1872 privileges were granted by the legislature for the construction of 12 lines of railway, with a telegraph system attached to each. The railway network penetrates the central provinces, from the capital to Belem in one direction, and to Rio Grande do Sul in the opposite, so that probably by the end of 1874 the traveller can proceed by rail from the Amazon to Uruguay almost without change of train. An important line is about to be built (1873) chiefly for carrying coals from the Candiota mines to the coast at Sta.

Catharina. The railways existing in 1872, with their respective lengths, and the receipts and outlays in 1869, are shown in the following table:

LINES.	Miles.	Receipts.	Expenditures.
São Paulo	87	\$1,148,526	\$423,363
Bahia	80	156,139	182,447
Pernambuco	80	424,400	263,369
Dom Pedro II.	140	2,312,908	1,072,351
Cantagallo	21	129,019	84,665
Mauá, or Petropolis ..	11	250,581	91,582
Total	419	\$4,418,873	\$2,118,727
Total in 1869 .....	...	3,214,859	1,662,575
Increase .....	...	\$1,204,014	\$456,152

An unusual outlay for repairs, together with a marked diminution of traffic, owing to deficient crops caused by disease in the sugar cane and the drought, gave rise to the deficit in the Bahia line. Of the foregoing lines, the most important is that of São Paulo, from Santos to Judiah, deserving of especial notice from its prosperous condition, due to the wealth of the province which it traverses. On Oct. 1, 1872, a line was opened from Maceió in Alagoas to the interior. There were at the end of 1872 nearly 1,600 m. of telegraph in operation; and the laying of a line from São Pedro do Rio Grande do Sul to Montevideo was commenced about the same time. A privilege was granted in 1872 for laying a submarine cable from Rio de Janeiro to Portugal, and the work was to be commenced immediately. The city of Rio de Janeiro is thoroughly permeated with lines of street railroads; in other cities lines have likewise been constructed, and prove of material benefit to the community, especially in a social point of view, having been instrumental in eradicating abuses under which Brazilian society has long groaned. Brazilian women, until lately condemned to a sort of Turkish seclusion, rarely going into the street, and never unaccompanied by father, brother, or husband, now travel alone in the street cars, and the custom is fast gaining ground. The great natural highways of Brazil, its majestic rivers, will afford an easy outlet for the productions of the interior, and a commencement has been made in turning these facilities to account. Weekly and even daily lines of steamers ply on the Amazon from Belem to the various towns along the course of that river. The Negro is navigated to a comparatively limited extent; steamers run regularly on the Araguaya-Tocantins from Belem to Goyaz; and vigorous measures are in progress to establish steam navigation on the São Francisco. Steamers ply constantly up the Paraguay (navigable through nearly the whole of its course) to Cuyabá, the capital of Matto Grosso, that being still the only route by which the province is readily accessible. A new survey of the Amazon at the expense of the imperial government was ordered in 1872, a preliminary step to the still further increase of steam facility on that river.

The English, on the one hand, have taken up steam navigation on the Amazon, so long carried on by a Brazilian company; and on the other, American enterprise is penetrating the Madeira and Mamoré to open up steam communication with the interior of Bolivia; and railroads will be built wherever navigation is impeded by insurmountable obstacles, such as the falls of the Madeira. Before the introduction of railways, the traffic between the coast and the interior was imperfectly carried on by mule trains, which is still in a large portion of the country the only available method.—There are in Brazil 19 banks and innumerable private banking houses. Chief among the former are the *bancos do Brasil, do Bahia, de Campos, Commercial do Rio Janeiro, do Maranhão, do Pernambuco, do Rio Grande do Sul, do Pará*; and the English of Rio de Janeiro, limited, London and Brazilian, Brazilian and Portuguese, the *banco Rural e Hypothecario*, and the bank of Mauá and co. The *sociedad economica de consumo*, having for its object the establishment of cheap shops, has a capital of \$150,000 in \$50 shares. The Mercantile Industrial bank of Rio, established in 1862, has a capital of \$10,000,000, in \$100 shares.—Brazil is governed by a hereditary and constitutional monarch. The constitution is based upon the fundamental law of March 25, 1824, modified by additional acts of Aug. 12, 1834, and May 12, 1840. The constitution establishes four powers in the state: the legislative, executive, judicial, and the “moderating” power, or royal prerogative. The legislative power is vested in a national legislative assembly and in provincial assemblies. The national assembly consists of two houses, senate and congress. The senators, 58 in number, are elected for life; and the representatives, 122 in number, are chosen by the whole of the free population (save minors, monks, and servants) for four years. Senators must be native Brazilians, have attained the age of 40 years, and possess an annual income of at least \$800. They receive a salary of \$1,800 for each session. Representatives are chosen by electors appointed by voters, every 30 voters having the privilege of naming an elector in each electoral district. The salary of the representatives is \$1,200 for each session, besides travelling expenses. The executive power resides in the emperor, assisted by his ministers and a council of state. The ministers are responsible for treason, corruption, abuse of power, and all acts contrary to the constitution; which responsibility cannot be evaded on the plea of orders from the sovereign. The latter has the power to convoke the ordinary meetings of the legislative assembly; nominate bishops, presidents of provinces, and magistrates; declare peace or war; and to sanction and superintend the execution of all measures voted by the legislature. By virtue of the “moderating” power, the sovereign can choose ministers and senators, withhold temporarily his sanction

from legislative measures, convoke extraordinary legislative assemblies, dissolve the house of representatives, and grant amnesties and pardons. The ministry is composed of seven departments: interior, foreign, finance, justice, war, marine, and agriculture, public works, and commerce. The council of state is composed of 12 ordinary and 12 extraordinary members, appointed for life by the sovereign. These councillors are for the most part ex-ministers; and the heir apparent to the throne, if of age, is by right a councillor of state. Each provincial government consists of a provincial chamber and a general council or legislative assembly. The members of the chambers are elected directly by the voters for two years; while the assemblymen are chosen by the same electors as the members of the national congress, their functions for the affairs of the provinces being analogous to those of the representatives for the affairs of the empire.—The army in time of peace is composed of 21 battalions of infantry (16,168 men), 5 regiments of horse (4,152 men), 1 regiment of artillery (5 battalions, and 1 battalion of engineers, 4,326 men); in all, 24,641 men, to which may be added 641 men forming a special corps. The strength in time of war is 78,784 men. The navy consists of 18 ironclads, 27 corvettes, 2 gunboats, and 7 transports, all steamers; besides which there are 38 sail of the line; making a total of 87 vessels, mounting 816 guns, and manned by 7,901 men. There are 6 vessels without armament, and a number of ironclads and other vessels of war were in course of construction in 1872. The total strength of the navy is 8,398, distributed as follows: 18 general staff officers, 545 first-class officers, 142 second-class, 101 forming a sanitary corps, 234 accountants, 62 boys, 132 engineers, 3,268 imperial marines; naval battalion, 1,275, and apprentice marines, 2,616.—The expenditure of the empire from 1855 to 1859 was as follows: 1855-’6, \$20,120,000; 1856-’7, \$20,187,500; 1857-’8, \$25,877,500; 1858-’9, \$26,859,000. After the Paraguayan war commenced, the expenditure increased as follows: 1864-’5, \$43,243,280; 1865-’6, \$60,980,929; 1866-’7, \$60,556,782; 1867-’8, \$75,523,870; 1868-’9, \$82,995,708; 1869-’70, \$73,189,858; 1870-’71, \$53,266,047. The amount to be disbursed in 1872 for emancipation annuities was estimated by the minister of finance at \$500,000; and that for 1902, when slavery is to cease, at \$8,000,000. About one fifth of the ordinary revenue is derived from land licenses and other taxes, such as that on transfer of property, &c.; more than one half proceeds from duties, export as well as import, the former being 13 per cent. on coffee and 9 per cent. on all other articles. From 1865 to 1870, when deficits were of frequent occurrence, these were covered by loans raised and bonds and paper money issued by government, and treated in the finance accounts as extraordinary receipts. The total receipts for the

financial year 1864-'5 were \$29,788,838; and for the year 1871-'2, \$46,884,316. The expenditure in 1871-'2 was as follows:

Ministry of the Interior :		
Civil list.....	\$699,735	\$2,564,060
Legislative Chambers.....	875,680	
Sundries.....	1,438,645	
Ministry of Justice.....		
“ Finance.....	1,718,764	
“ Foreign Affairs.....	19,712,587	
“ War.....	408,909	
“ Marine.....	6,816,658	
“ Commerce, Agriculture, Public Works, &c.....	4,434,186	
	6,004,258	
Total.....		\$41,154,423
Receipts in 1871-'2.....		
		\$46,884,816
Expenditure in 1871-'2.....		
		41,154,423
Surplus.....		
		\$5,729,594

The revenue has been steadily increasing since 1864, at the rate of 75 per cent. approximately; while the increase of the ordinary expenditure in the same period has not exceeded 20 per cent. The indebtedment of Brazil to England in 1862 was \$25,000,000, the foundation of which had been laid by loans to cover old charges of the colonial time, the war with Uruguay, payments of indemnities to foreign nations, and to cover deficits originating from year to year; and in 1872 the amount reached \$300,000,000, exclusive of railway guarantees, being an increase of \$275,000,000 in ten years. A loan of \$15,000,000 was contracted in February, 1871. In 1872 the following were the constituent elements of the national debt:

Foreign debt.....	\$300,000,000
Internal debt, at 4, 5, and 6 per cent.....	140,223,450
Debt prior to 1827.....	173,587
Orphans' funds and deposits.....	12,496,773
Paper money.....	78,589,081
Total.....	\$528,442,796

The issue of the 4½ per cent. loan of 1860 amounted to \$6,865,000; of that sum, \$2,266,500 was redeemed on June 1, 1872, leaving \$4,598,500 still to be reimbursed by the operation of the accumulative sinking fund. Besides the general receipts, there are the provincial and municipal receipts; the former amount to \$11,500,000, the latter to \$2,500,000. A credit extraordinary of \$186,500 was opened to the ministry of agriculture in 1872, to meet the expenses of the national exhibition to be held in Rio de Janeiro. The aggregate customs receipts of the empire in 1868-'9 were \$31,746,774. —Public education has not yet reached a high point of development in Brazil; but numerous schools have been established of late in the provinces, and the government is engaged in developing and strengthening a general system. There are at present 4,437 schools in the empire; 3,603 being public and devoted to primary and secondary education, and 834 private schools. The number of secondary schools is in the proportion of one for every 18 primary; and there are twice as many schools for males as for females. The average annual cost of each public school is \$467; and the whole of the public schools cost annually \$1,681,000, or

nearly 15 per cent. of the average annual revenue of all the provinces. In each of the latter there is one private primary school for every five public, and one school for every 2,404 inhabitants of all classes and colors; and these schools are attended by an average number of 305 children. The total number of scholars enrolled is 183,950, 125,867 of whom receive primary, and 8,083 secondary education. These figures show a marked improvement as compared with the returns of former years: in 1868, only 107,483 children attended school in the whole empire, or 26,467 fewer than at the present time. There are two faculties each of law and medicine maintained at the expense of government; the imperial academy of medicine has an annual subsidy of \$1,000. Besides these there are 11 seminaries for the education of the clergy, subsidized by the state, a central college, an academy of arts, regimental and preparatory schools for the army, and a school of artillery. The whole educational system is under the jurisdiction of the minister of the interior and the control of the general assembly. The English merchants of Rio de Janeiro subscribed \$6,500 in 1872 for the establishment of a gymnasium for the use of the English-speaking young men resident in that capital. An annual subsidy of \$3,500 is given by government to the geographical and historical institute of Rio de Janeiro. Besides the libraries connected with the various public scientific and literary establishments, there are in Rio de Janeiro 11 public libraries, chief among which is the *gabinete portuguez* possessing 50,000 volumes, and being visited on an average by 2,814 persons yearly. By the provincial law of Dec. 26, 1871, the creation of libraries in all the cities of Rio de Janeiro was authorized; and there are libraries in most of the other provinces of the empire. There are dramatic and musical conservatories, an academy of fine arts, and other institutions for the promotion of literature, art, and science. The astronomical observatory of Rio de Janeiro was the object of important modifications in 1872. —The religion of the state is the Roman Catholic. The whole empire constitutes one "metropolitan province," under the archbishop of Bahia. There are 12 dioceses: Bahia, São Sebastião (Rio), Olinda (Pernambuco), Maranhão, Grão Pará, São Paulo, Mariana (Minas Geraes), Goyaz, Cuyabá (Matto Grosso), São Pedro do Rio Grande do Sul, Ceará, and Diamantina (Minas Geraes). Over these dioceses preside one archbishop and 11 bishops. Brazil is divided into 1,299 parishes, most of the vicars of which are foreigners, chiefly Portuguese. Although the Roman Catholic is by law constituted the religion of the state, all other religions are tolerated, but restricted in their worship to buildings "without the exterior form of temples." In Rio de Janeiro and elsewhere there are Protestant churches; and the ministers of the Swiss and German colonies are paid by government. The United States Presbyterian

board of foreign missions maintain a mission in Brazil, with ten ministers and three churches in each of the cities of Rio de Janeiro and São Paulo, and some in Bahia. Their communicants number 347, nearly all native Brazilians. —Pedro Alvares Cabral, having been appointed admiral of a fleet sent by King Emanuel of Portugal to follow up the brilliant discoveries of Vasco da Gama in the East Indies, set sail March 9, 1500; but the fleet having been carried by ocean currents and adverse winds far to the westward of the intended course, Cabral on April 22 unexpectedly found himself in sight of land; and on the 25th the squadron cast anchor in a commodious harbor which the admiral named Porto Seguro. Cabral immediately took possession of the country in the name of his sovereign, calling it Vera Cruz, a name afterward changed to Santa Cruz, which in turn gave place to the present one of Brazil. This formality concluded, he once more set out upon his voyage eastward, but not without having previously despatched to the king tidings of his discovery. On the arrival of the news, a squadron was fitted out under the command of Amerigo Vespucci to visit and explore the new country; and that navigator on his return to Portugal published an account of his explorations with a map, to which publication is due the name America given to the whole western continent. Vespucci on his return carried some specimens of Brazilian birds, and a cargo of dyewoods, whole forests of which he reported as existing in the newly found country. These dyewoods immediately became the object of an extensive and lucrative traffic on the part of numerous speculators. Merchants of other nations having engaged in the trade, King John III. determined to suppress what he regarded as a violation of his rights. Colonies were accordingly established under the auspices of the crown in 1531, towns sprang up rapidly along the coast, and fortune for a few years seemed to smile upon the new settlements. But the colonists had suffered much from the frequent incursions of the savages; the pecuniary resources of the Portuguese nobles who had received land grants from the government, and full judicial powers, on condition of establishing the colonies at their own expense, soon proved inadequate to the enterprise; and it was deemed advisable to form a permanent system of colonial rule, immediately dependent upon the home government. A governor was accordingly appointed in 1549, in the person of Thomé de Souza, who was invested with unlimited powers of jurisdiction, both civil and criminal, and under whose wise administration the home government in a short time recovered possession of the early colonies, or *capitanias*. De Souza founded and took up his residence at São Salvador da Bahia, which was then constituted the capital of Brazil. A colony of French Protestants was founded in 1555 on an island in the bay of the present Rio de Janeiro; but the perfidy of the founder,

Vice Admiral Villegagnon, and consequent internal dissensions, marred the success of the settlement; and the colonists were expelled from the island in 1565. The Portuguese in 1567 built the city of São Sebastião, since called Rio de Janeiro, the name given to the bay by Martim Affonso in 1531. After the annexation of Portugal to Spain under Philip II. in 1580, Brazil found numerous enemies among the nations then on hostile terms with the latter kingdom; the coast towns suffered much from the successive inroads of the French, English, and Dutch, by whom they were in turn occupied, pillaged, and abandoned. In 1612 the French took possession of Maranhão, and founded the city of São Luiz do Maranhão, from which they were driven by the Portuguese in 1615. But the Dutch were the most pertinacious in their endeavors to secure a firm foothold in Brazil. A fleet from Holland in 1623 captured the city of Bahia; but in 1625, after the departure of their ships, the conquerors were forced to capitulate. In 1629 the Dutch took Pernambuco, and they extended their conquests with so much energy that in 1645 they ruled the whole territory N. of that city except Pará. The Portuguese, however, recaptured province after province, and in 1654 had completely driven out the Dutch, who by the peace of 1660 renounced all claim to Brazilian territory. In the mean time the house of Braganza had been restored to the throne of Portugal, in the person of John IV., Brazil erected into a principality, and the title of prince of Brazil conferred upon the Portuguese heir apparent (1640). From the time of the evacuation of the Dutch, Portugal remained in peaceful possession; but the exactions of the mother country drained the colony of its resources and retarded its development. Meanwhile the mineral riches of Brazil had been discovered; gold and diamond mining were in active operation, and poured a constant stream of wealth into the home treasury; and the Lisbon government constituted Rio de Janeiro the capital instead of Bahia. In 1807, when Napoleon declared war against Portugal, John VI., its reigning sovereign, took refuge with his family in Brazil, followed by a large number of courtiers and other emigrants. This event was immediately attended by important modifications in the colonial administration; restrictions upon commerce were removed; the ports were thrown open to the shipping of all friendly nations; and on the fall of Napoleon in 1815 Brazil was raised to the rank of a kingdom, John assuming the title of king of Portugal, Algarve, and Brazil. During his absence from Portugal a revolution had broken out there, and the constitution of Spain had been proclaimed, September, 1820; and as that example had been followed in Pará and Pernambuco, the king, fearing that the revolutionary movement might extend to Rio de Janeiro, took himself the initiatory steps, and proclaimed the constitution of Feb. 26, 1821. Soon afterward he returned

to Portugal, having appointed his son, Prince Pedro, regent of Brazil. A revolutionary movement took place in April, 1821. Brazil was proclaimed an independent empire, Oct. 12, 1822, and Dom Pedro crowned emperor Dec. 1. A constitution was adopted early in 1824; and the independence of the empire was acknowledged by the government of Lisbon, Sept. 7, 1825. In 1826 Dom Pedro became by the death of his father king of Portugal, but resigned that crown to his infant daughter Dona Maria da Gloria. In the same year the Brazilian government declared war against the Argentine Republic, which was seeking to convert Uruguay into an Argentine province; but peace was restored through the mediation of Great Britain, and Montevideo declared an independent republic. Meanwhile disputes had arisen between the emperor and the chamber of deputies, and only ceased with the abdication of the former, April 7, 1831, in favor of his son Pedro II., then in his sixth year. (See PEDRO I.) The country was governed by a regency till 1841, when the emperor was declared to have attained his majority, and crowned July 18. A law for the abolition of the slave trade was promulgated in 1831, and another in 1850 for the final abolition of slave traffic. Several political uprisings occurred in the empire from 1841 to 1849, chiefly in Minas Geraes and Pernambuco, directed against the provincial governments, or against the measures or ministers of the central government; but none attained the proportions of a civil war. An alliance was formed by Brazil, Uruguay, and the forces of Entre Rios, against Rosas, the Argentine dictator, with whose fall (at Monte Caseros) and flight to England, hostilities were terminated in February, 1852. In 1865 war was declared against Paraguay, and an offensive alliance was formed between Brazil, Uruguay, and the Argentine Republic, May 1, with the express stipulation that "none of the high contracting powers should lay down arms until the present government of Paraguay should be overthrown." For the motives, progress, and termination of this long and disastrous war, which ended in the defeat and death of the dictator Lopez, March 1, 1871, see ARGENTINE REPUBLIC, and PARAGUAY. Toward the close of the year 1871 a controversy arose between the governments of Buenos Ayres and Rio de Janeiro, which threatened for a time to disturb the friendly relations existing between Brazil and the Argentine Republic. The latter protested against certain treaties concerning boundaries and a war indemnity ratified separately with Paraguay by Brazil, without the concurrence of the two other allied powers, and in violation of certain articles of the treaty of alliance of May 1, 1865; but the negotiations between the two countries came to a favorable termination in October, 1872, it being agreed that the Argentine government should also arrange boundary questions by separate negotiation,

as Brazil had done. In 1848 yellow fever broke out in the province of Bahia, and spread rapidly through all the maritime provinces, causing frightful mortality. In 1855 an epidemic of cholera morbus visited Pará, and afterward the other provinces, carrying desolation through all parts of the empire, and especially Alagóas. In 1872 an unknown distemper manifested itself in three towns, and carried off 18,000 out of 18,000 inhabitants.—See "The Naturalist on the River Amazons," by Henry Walter Bates (2d ed., 8vo, London, 1864); "A Narrative of Travels on the Amazon and Negro," by Alfred R. Wallace (8vo, London, 1853); "A Journey in Brazil," by Prof. and Mrs. Louis Agassiz (8vo, Boston, 1870); "Geology and Physical Geography of Brazil," by Prof. Hartt (8vo, Boston, 1870).

BRAZIL NUT, the fruit of the order *Bertholletia excelsa*, a large tree of the order *lecythidaceae*, found chiefly on the Orinoco. The nuts are of the form of triangular prisms, with very hard shells; they contain a rich oily meat in one piece like an almond. They are arranged in



Brazil Nut, showing Fruit cut open, disclosing the arrangement of Nuts.

four cells, each of which contains six or eight nuts, and all are included in a spherical case, half as large as a man's head. The Portuguese formerly carried on an extensive trade in these nuts. They are now chiefly exported from Pará, and continue to form an article of great commercial importance. When fresh, they are highly esteemed for their rich flavor; but they become rancid in a short time from the great quantity of oil they contain. This has been largely extracted for use in lamps.

BRAZIL WOOD, the name given to several varieties of red dyewood, brought from South America, Central America, and the West Indies. The genuine Brazil wood, sometimes called Pernambuco wood, is brought from the province of this name in Brazil. The tree is known as the *caesalpinia crista*. Other varieties are the braziletto (the most inferior kind of Brazil wood), from the West Indies, the product of the *C. Brasiliensis*; the *sapa*,

or sampfen wood, of the *C. sapan*; and the Nicaragua or peach wood, also from a species of *caesalpinia*. It is said that the name was applied to the wood (of which there are species



Brazil Wood—Leaves, Flower, and Fruit.

in the East Indies) long before the discovery of America, and that the great territory in South America was named Brazil in consequence of the abundance of the *caesalpinia* trees. So valuable were these considered that the wood was monopolized by the crown, and called *pão da rainha*, queen's wood. The tree grows to a large size, is crooked and knotty, and bears fragrant red flowers and small leaves. The wood is heavy and hard, takes a fine polish, and sinks in water. When first cut it is pale, but the red color deepens on exposure. The heaviest qualities are preferred. By boiling Brazil wood, reduced to powder, in water, the wood becomes black, while the water receives the red coloring principle, which is a crystallizable substance, named braziline. Long-continued boiling extracts it all; but a deeper red is imparted to alcohol or ammonia. The dye is improved by standing a few weeks, even if it ferments. At the best, however, it is not permanent; the colors are fixed only by a preparation of the articles to be dyed, which consists in impregnating them with suitable mordants, as alum and tartrate of potash. Acids and alkalis affect differently the shades of color of the dye; the former making it more yellow and permanent, and the latter deepening the hue to purple and violet shades. Brazil wood has been somewhat superseded by a dyewood of superior quality called camwood, supposed to be the product of the *baphia nitida*, which grows in Africa, and is obtained at Sierra Leone. It was formerly supposed that there were some medicinal properties in Brazil wood; it was observed to have a sweet taste, and to stain the saliva red, and it was made an ingredient in some prescriptions. It is now used in pharmacy only to color tinctures. Red ink is prepared from it by boiling the wood in water, and adding a little gum and alum; it is also used to make a

lake-red paint. Paper saturated with it is used in chemical analyses as a test for sulphurous acid, by which it is bleached; also for fluorine, which turns it yellow.

BRAZING, the uniting of two pieces of metal, as of brass or copper, or one piece of each, by hard solder. Hard solder is distinguished from soft by being made of metals that require a higher temperature to melt them; but all solders should melt more easily than the metals they unite; and to give the maximum of strength, they should have about the same hardness and malleability as these metals. For brass, copper, iron, German silver, &c., the solder used is an alloy of zinc and copper in equal parts, or for a harder mixture, two parts of zinc to three of copper. The two surfaces to be united are made perfectly clean and bright, then brought together and secured with wire or otherwise in their place, and covered around their edges with the granulated solder, mixed with pounded borax and wet with water. The parts are then heated; the borax melts, and runs over the bright surfaces, protecting them from oxidation; and as the heat increases it fluxes the solder, and this suddenly flushes, or runs through the joints, uniting with the two surfaces, and making with them one piece, as the parts cool and the solder sets. The pieces are then dressed with the file. It is sometimes convenient to cover the joints and the solder with a clay lute before heating; this is done in soldering iron, to prevent a scale of iron forming on the surface. The borax may be first melted and run into glass of borax, or allowed to froth up upon the joints.

BRAZORIA, a S. E. county of Texas, bordering on the gulf of Mexico; area, 1,260 sq. m.; pop. in 1870, 7,527, of whom 5,786 were colored. It is watered by the Brazos and San Bernard rivers, which are navigable, and by numerous smaller streams which flow into the gulf. The Houston Tap and Brazoria railroad terminates at Columbia in this county. The manufacture of extract of beef is extensively carried on. The surface is level, one half covered with valuable oak forests, and the rest prairie. The soil is red, deep, and very productive. The chief productions in 1870 were 207,881 bushels of corn, 2,988 bales of cotton, 4,740 lbs. of wool, 1,423 hhds. of sugar, and 92,450 gallons of molasses. There were 2,775 horses, 1,776 mules and asses, 2,207 milch cows, 42,770 other cattle, 1,856 sheep, and 7,487 swine. Capital, Brazoria, on the Brazos, 48 m. S. of Houston.

BRAZOS, a river which rises in the N. W. part of Texas, in Bexar district, flows first E., then S. S. E. across the state, and falls into the gulf of Mexico, in Brazoria county, about 40 m. S. W. of Galveston. The distance from its source to its mouth is nearly 500 m., which is increased by the bends of the river to about 900 m. During the rainy season, from February to May, it is navigable by steamboats about 300 m. to Washington, and at all times 40 m. to Columbia.

BRAZOS, a S. E. central county of Texas, bounded E. by the Navasoto river and W. by the Brazos, which unite at its S. extremity; area, 578 sq. m.; pop. in 1870, 9,205, of whom 3,759 were colored. It has an undulating surface, about one half of which is covered with oak and other trees. Much of the soil is rich loam. There are mineral springs of sulphur and magnesia. The Houston and Texas railroad traverses the county. The chief productions in 1870 were 205,864 bushels of corn, 38,597 of sweet potatoes, 6,927 bales of cotton, 18,001 lbs. of wool, and 36,639 of butter. There were 2,172 horses, 2,852 milch cows, 14,145 other cattle, 8,565 sheep, and 14,420 swine. Capital, Bryan.

BRAZOS DE SANTIAGO, a village and port of entry of Cameron county, Texas, on the gulf of Mexico, near Point Isabel, 85 m. E. N. E. of Brownsville. For the year ending June 30, 1871, the imports from foreign countries amounted to \$1,517,409; domestic exports, \$695,889; foreign exports, \$1,740,607. The foreign entrances were 33 vessels, of 8,525 tons, and the clearances 42 vessels, of 11,739 tons; in the coasting trade, the entrances were 76 vessels, of 33,458 tons, and the clearances were 71 vessels, of 31,915 tons.

BRAZZA, the largest and most productive island in the Dalmatian archipelago, belonging to Austria; area, 153 sq. m.; pop. about 16,000. It is mountainous, San Vito, the highest summit, being about 2,500 ft. It has good harbors, and trades in wine. Capital, San Pietro.

BREAD. See ALIMENT.

BREADFRUIT, the product of the breadfruit tree (*artocarpus incisa*), which belongs, like the yack (*A. integrifolia*), to the order *urticaceae*, distinguished in the sub-order to which



Breadfruit Tree.

artocarpus belongs by flowers combined in fleshy heads, stems with milky juice, which is often acrid, sometimes nutritious. The breadfruit is a native of the Pacific islands, where it

grows to the height of 40 feet or more, and from the size of its deeply incised leaves, more than a foot long and 10 inches wide, forms a very ornamental tree. The wood is much used,



Breadfruit—Leaves, Flower, and Nut.

and the juice furnishes a sticky birdlime, but the fruit is the most valuable part. The flowers are unisexual, and the cluster of female flowers becomes a green globular fruit, half a foot or more in diameter. The seeds are roasted and much resemble chestnuts; but the varieties most prized do not bear seed; the ovaries become thickened, and when nearly ripe the receptacle is gathered and baked, by preference in ovens in the ground. The crust is removed to the depth of half an inch, and the farinaceous pulp eaten fresh, when it much resembles bread made with eggs, and of close texture; or it is mashed and packed in bundles which are buried in the earth for future consumption. A slight fermentation takes place and then ceases, and the pasty mass will keep several months. If suffered to remain on the tree until fully ripe, the fruit becomes sweet and resembles clammy cake rather than bread, with an unpleasant odor. Where seeds are not produced the tree is propagated by suckers or cuttings. Mixed with cocoanut milk, the pulp makes an excellent pudding. The fibre of the bark is used for *tapa*, or bark cloth, being strong as in most of the nettle family.—The yack differs from the breadfruit in having a smaller, entire, glabrous leaf, and attains a greater height, while the branches are not so spreading. The fruit is longer than the breadfruit and two or three times as large, and springs from the trunk of the tree, as the branches would be unable to bear so great weight. The seeds are enclosed in a sac of juicy yellow pulp, which has a strong stench of decomposing animal matter. When the repugnance to the smell is overcome, the pulp becomes a favorite edible. The yack is much cultivated in India.

BREAKWATER, an obstruction of any kind raised to oppose the action of the waves, and

make safe harbors and roadsteads. The outer mole of the harbor of Civita Vecchia was built by the emperor Trajan for this purpose; and the piers of ancient Piræus and of Rhodes are of the same class of structures. Josephus says that Herod, in order to form a port between Dora and Joppa, ordered mighty stones to be cast into the sea in 20 fathoms water, to prepare a foundation; the greater number of them being 50 ft. in length, 9 ft. deep, and 10 ft. wide, and some even larger. In the use of such immense blocks of stone, the true principles of constructing a permanent barrier to the waves appear to have been better understood than they were 17 centuries afterward. In modern times, the great breakwaters are those of Cherbourg in France, of Plymouth in England, and of Delaware bay in this country. From the experience acquired by their construction and history, principles before little understood have been established, upon which such works must be built to withstand the enormous forces opposed to their permanency. These were so little known in the last century, that one of the commissioners appointed by direction of Louis XVI. to report upon the best locality for establishing, opposite the English coast, a port and naval arsenal, recommended the construction of a dike of 2,000 toises in length, in water 70 ft. deep, in front of the harbor of Cherbourg, by sinking a vast number of ships filled with masonry as a nucleus, and covering these with heavy stones to within 18 ft. of the surface. And when at last four of the ablest naval officers and engineers of France were appointed to execute the work, which was regarded as one of the most stupendous operations, certainly the greatest piece of hydraulic architecture, ever undertaken by man, the plan they adopted was one which proved impracticable after having been prosecuted from the year 1784 to 1789, at enormous expense. This plan was the construction of huge truncated cones of timber, which, of the reduced size at which they were actually built, measured 36 ft. in height, with a circumference of 472 ft. at base, and 339 ft. at top, the angle of the slope being 60°. This was strengthened by an interior concentric cone, 5 ft. 10 in. within the outer one. The frame of each was made of 80 large upright timbers 24 ft. long and 1 ft. square. On these were erected 80 more of 14 ft. in length, making 320 of these uprights for the two exterior and two interior portions. The structure was then planked, hooped, and firmly bolted together. The first cone was built and floated at Havre, then taken to pieces, transported to Cherbourg, and floated off and sunk on June 6, 1784; the second on July 7, in the presence of 10,000 spectators; but before the cavity of this one could be filled with stones, its upper part was demolished in August by a storm of five days' continuance, and the stones it contained were spread over the bottom, interfering with the placing of the next cone. The original plan was to set 90 of these cones,

of 150 ft. diameter at base, 60 at top, and 65 ft. in height, in succession, and fill them with loose stones or masonry, and the spaces between them with a network of iron chains, to break the force of the waves. The number was afterward reduced to 64. After the second cone went to pieces, the government directed that the remainder should be set 192 ft. apart. This distance, by a new order, was increased to 1,280 ft., the spaces to be filled in with loose stones. At last, when 18 cones had been sunk at enormous expense, and with serious damage to many of them, the plan was abandoned, and the tops of those left standing were cut off down to low-water mark in 1789, and the system of construction by sinking rocks was recognized as the only process sure to succeed. The filling in of stone was continued till, at the end of the year 1790, the quantity sunk was estimated at 5,300,000 tons; and the total expenditure, by the estimate presented to the legislative assembly in 1792, was about 81,000,000 francs, or \$5,800,000. The commission appointed in 1792 by the departments of war, marine, and the interior, reported, after careful examination of the dike and of the partial protection it already afforded at different stages of the tide, that its stability could not be depended upon except by the use of larger blocks of stone as a facing than had before been employed, these stones to be at least of 15 to 20 ft. cube; and they recommended that the dike be raised 31 ft. above the level of the lowest tide, which would make it about 9 ft. above that of the highest tides. But the revolution succeeding, further work was interrupted. In 1802, by advice of a new commission appointed two years previously by a new government, it was determined to raise the central portion of the breakwater to the height before recommended, for 195 metres (640 ft.) in length, and to give it a breadth at top of 19·5 metres, in order to construct upon it a battery of 20 pieces of the heaviest artillery; and it was proposed to finally complete the two extremities in the same manner. At that time the old work, which had originally been raised to low-water mark, was reduced by the action of the sea to 15 or 18 ft. below it, and the profile imparted to it was regarded as that of greatest stability with least expenditure of material. The interior slope was one of equal height and base, 12·5 metres. The slope exposed to the sea had at bottom a height of 6·3 metres to a base of 9, succeeded by one of 6·2 to a base of 47·5; its original form was a uniform slope of 1 in height to 3 of base. The sea washing over the top tended to move the stones from the outside to the inside; and it was essential to oppose this action by raising the top above the surface of the water. In 1808 the central portion was completed to low-water mark, and a superstructure or parapet, of blocks of 60 to 80 cubic feet each, was raised along the south or inner side to the height of the highest tides, along which the smaller stones used in the construction, pressed upward

by the great waves in the winter storms, collected and formed a solid and compact surface, at a new slope, of which the base was about quadruple the vertical height. It was observed that the lateral movement of the small stones by the storms, driving obliquely along the outer face of the dike, caused them to collect at each extremity in a conical mound of the precise configuration traced for the proposed terminal batteries; but to prevent their extending into and obstructing the passes, it was found indispensable to face the whole exterior with blocks large enough to resist these oblique impulsions. In May, 1805, the battery on the central portion was armed with 20 pieces of heavy ordnance. In February and May, 1807, occurred two great storms, the effects of which upon this portion, as also of the unprecedentedly severe storm of Feb. 12, 1808, are described in the "Memoir upon the Dike of Cherbourg, compared with the Jetty or Breakwater at Plymouth," by the baron Cachin, inspector general of roads and bridges. In the last named storm the battery was submerged, the parapet was upset, and the barracks and garrison, with 60 men, were swept away. The large blocks of stone with which the dike was faced were by this storm arranged in new positions, and so closely stowed that they appeared as if placed by the hand of man in positions of the most perfect stability. As thus arranged, the outer side presents four slopes. At the upper part, reached only by the tops of the waves, the height is to the base as 100 to 185. Beneath this is the space between the high and low-water marks, which is exposed at all times of tide to the most violent action of the sea; its slope is the most inclined, the height being to the base as 100 to 540. Below the lowest spring tides is a space but little exposed to the action of the waves; the height of this slope to its base is as 100 to 802. The lowest part, which is always submerged, has a height of 100 to a base of 125. The slope on the inner side is of 45° . From the experience of these two breakwaters, incomparably the greatest of their sort which have ever been undertaken, M. Cachin concludes with the observation, that if man be strong enough to heap together rocks in the midst of the ocean, the action of the sea alone can dispose them in the manner most likely to insure their proper stability. This, it may be added, will necessarily vary in form with the specific gravity and

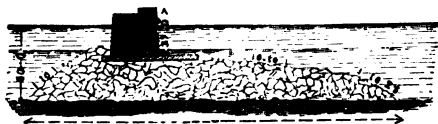


FIG. 1.—Section of Cherbourg Breakwater.

size of the stones used. In 1830 it was decided to raise the dike by building up a wall of rubble masonry faced with granite to the height of 6 ft. above highest water. This is protected

by a foreshore of great blocks of stone on the outer side, which extend in a slope of 120 ft. to the depth of 21 ft. below low-water mark. This nearly vertical wall (the slope of its sides being $\frac{1}{4}$ to 1) is 36 ft. 3 in. wide at base, and 29 ft. 3 in. wide at top. A parapet is raised to the height of 6 ft. upon its outer edge, which is 8 ft. 3 in. thick; at top 8 ft. 6 in. wide. The altitude of the breakwater is given by the United States commission of engineers and naval officers, who examined it in 1829, at 72 $\frac{1}{10}$ ft., the base of its sea slope being 228 $\frac{1}{10}$ ft.; and they state that similar proportions were adopted at the Plymouth breakwater, the altitude of which is 57 ft., and base 180 ft. The inner slope of this, however, was built at an angle of 32° , although that of Cherbourg had stood perfectly well at 45° . The adoption of the general plan of this work by the English and American engineers sufficiently proves the correctness of its principles, though by some English authorities the work is alluded to as a failure.—The breakwater at Plymouth, England, to protect the inner harbor from the heavy sea that is driven in by southerly storms, was commenced in 1812. Its dimensions are only about one fourth of those of



FIG. 2.—Section of Plymouth Breakwater.

the breakwater at Cherbourg, its total length being 1,700 yards, made up of a central portion of 1,000 yards, and a wing bending in from each end, at an angle of 120° , of 350 yards. Its profile is 998 sq. ft. It was designed to have a base of 210 ft., breadth at top 30 ft., and height in the middle 40 ft. Its actual height exceeds this, but it is only about 3 ft. above the highest tides. It is built of large blocks of limestone, some exceeding five tons in weight, brought in vessels from the quarries at Catwater, about $2\frac{1}{2}$ m. up the harbor. The convenience of position of these quarries for loading the vessels, the facilities of quarrying the stone, and the judicious arrangements introduced, made the work of comparatively light expense. After some experience was had, the stone was quarried by contract at 2s. 5d (58 cents) per ton, and transported for 34 cents; and the total cost of the stone laid, including land purchases, salaries, buildings, &c., was estimated in 1816 at about 8s. 1 $\frac{1}{2}$ d. per ton. In 1841 it was calculated that 3,369,261 tons of stone had been laid, at a cost of nearly £1,500,000; and the work was considered as being essentially completed. The 15 vessels kept employed in transporting the stone were furnished with two railways laid along in the hold, upon which were run the loaded cars from the quarries, entering through two stern-ports. These could be tightly closed when the vessel was loaded. On each

side were arranged eight trucks of the extreme capacity of five tons each. In discharging, these were drawn out by a windlass on deck, and upset as they passed out of the ports, each one being drawn up on the deck and run forward to make room for those behind. At the quarries they left the deck, and the track on which they descended over the stern being raised up, the loaded cars were run under it, into the hold. The usual cargo of 45 to 65 tons could thus be discharged in less than an hour. On Jan. 19, 1817, the work was tried by one of the most severe storms ever known. The breakwater, though in an unfinished condition, caused perfect protection to the inner harbor, where without it the damage would have been immense. Previous gales had had no effect upon it; but this caused the upper stratum of the finished part, 200 yards in length and 80 in breadth, to be stripped, and the huge stones of two to five tons weight to be carried over from the outside, and deposited upon the northern side of the breakwater. The quantity thus removed was estimated at 8,000 tons. Since that time the outer slope has been "cased with regular courses of masonry, dowelled, joggled, dovetailed, and cramped together; the diving-bell being brought into requisition for placing the lower courses, which were of granite, and were laid horizontally on their natural beds, and dovetailed, lewised, and bolted together." This work was reported by Mr. Stuart, the superintendent of the breakwater, to have been done on a slope of 5 to 1, as the sea had left it. The foot of the outer slope has also been extended further out with loose stones, to give protection to the courses of masonry. The additional cost since 1841 for this and similar repairs has been about £200,000, making a total expense of £1,700,000.—The new breakwater at Dover, in process of slow construction, is formed by an outer and inner wall of ashlar masonry, with a course of granite on the face, and blocks of concrete made with Portland cement and shingle in the core of the work to the level of high water, above which it is filled



FIG. 3.—Section of Dover Breakwater.

with liquid concrete. The masonry commences from the chalk bottom of the bay, the blocks being placed by means of diving apparatus. Both the inner and outer walls deviate from a perpendicular about three inches to the foot, in steps. A parapet 15 ft. above the level of high water surmounts the work on the sea side. All the operations are carried on from timber staging. The water at Dover is very deep, 42 ft. at low tide, and the construction of the breakwater is upon the principle that the motion imparted by waves to water much

below the surface is vertical, and that a vertical wall is best calculated to resist their action. There is a difference of opinion on the subject, and more time than has elapsed since such structures have been commenced will be required to allow a definite conclusion to be reached.—The construction of an important breakwater was commenced at Portland, on the southern coast of England, in 1849. On July 25 Prince Albert laid the foundation stone, and ten years later the works were so far advanced as to afford safe anchorage to vessels. The breakwater commences with a pier which starts from the island of Portland, near the point where it is connected with the mainland. The pier runs due E. for about 1,900 ft., at which point there is an opening 400 ft. wide, with a minimum depth of 45 ft., to admit vessels. On the other side of this opening the outer mole of the breakwater commences, and, after proceeding a short distance in the same direction as the pier, turns, and extends in a N. E. direction for a distance of 6,000 ft. The pier, or inner mole, consists of a rubble mound composed of stones of all sizes, from masses of eight tons weight down to small chippings. After the mound had been well consolidated a trench was excavated in it down to the level of low spring tides and a wall of masonry erected. The face course of this wall is formed of large squared blocks, the body consisting of heavy rubble work set in water cement. The face courses, up to 6 ft. above high-water level, are of hewn granite, and the rest of the face is of the best stone from the neighboring quarries. The outer mole, or breakwater proper, is a rubble bank with a width at the base of 800 ft., at low-water level of from 90 to 100 ft., and at the top of 60 ft. The slopes on the sea face, from the bottom to a height of 12 ft., are 6 to 1; on the harbor face they are 1½ to 1. The sheltered area is about 2,100 acres up to low water line. Connected with the works are two forts, an inner one on the end of the pier, and another at the further end of the outer mole. The inner fort is 100 ft. in diameter, mounts 8 guns, and stands in 9½ fathoms of water. The outer fort has a rubble base 45 ft. high, and containing 140,000 tons of stone. Its diameter is 200 ft., and it stands in 10 fathoms of water. The completion of the work was celebrated with great pomp, Aug. 10, 1872, when the prince of Wales laid the top stone and declared the work finished. The execution of this magnificent work is interesting as affording an example of the economical use of the force of gravity alone as a motive power in moving loads to and from a given point. The quarries from which the stone is obtained are about 380 ft. above the sea level. Three inclined planes, each having two tracks, extended down to the breakwater. A wire rope passing over a drum connected two trains of trucks, one train descending with a load while the other ascended empty. A temporary staging was

constructed along the line of the breakwater on which the trucks were propelled, and from which their contents were dumped into the water. The quantity of stone deposited per day varied from 2,000 to 3,000 tons, the total quantity used in the work being about 6,000,000 tons. It was quarried and landed mostly by convict labor, from 600 to 1,000 prisoners having been employed. About 100 men were engaged in the actual work of construction. The cost of this extensive work has been only about £1,013,000, for which the British nation possesses one of the most magnificent harbors in the world.—In 1828 a commission consisting of Commodore Rogers of the navy, Brig. Gen. Barnard of the engineer corps, and William Strickland, architect and engineer, was appointed by the United States congress to ascertain the most eligible site and to prepare plans and estimates for a harbor near the mouth of Delaware bay. In their report, made Feb. 2, 1829, they selected Cape Henlopen as the site of a breakwater. They said: "The objects to be gained by an artificial harbor in this roadstead are to shelter vessels from the action of the waves caused by winds blowing from east to northwest round by the north, and also to protect them from injuries arising from floating ice descending from the northwest." They proposed two works, a breakwater proper, to secure the first object, and an ice-breaker, as an auxiliary to the breakwater, but chiefly to protect vessels against the ice. The breakwater was designed with a length of 1,200 yards, and on a course N. N. W. drawn from a pitch of the cape. The ice-breaker was designed with a length of 500 yards, on a course W. by S. $\frac{1}{4}$ S., and so placed that the line of the breakwater would meet its S. W. extremity if extended, leaving an opening between the breakwater and cape of 500 yards, and between the breakwater and ice-breaker an opening of 350 yards, with a depth of water of 24 ft. The area protected against all the most dangerous winds, with a depth of 3 to 6 fathoms, is estimated at 860 acres.



FIG. 4.—Section of Delaware Breakwater.

The work was commenced in 1829, under direction of Mr. Strickland, and in 1834 it was so far advanced that vessels found protection behind it. Blocks of rubble from the nearest quarries were thrown in to form their own slopes for a foundation. The outer covering to within 6 ft. of low-water mark was of blocks from 2 to 3 tons weight; from this to low-water mark they were of 3 tons; thence to high-water mark, 3 to 4 tons; and above this, 4 to 5 tons, to a height of 4 ft. 8 in. above highest water. The ordinary rise of tide is nearly 5 ft., equinoctial tides 7 ft., and extreme tides 10 ft. As

the breakwater was built, its exterior slope for the first 16 ft. from bottom was at an angle of 45° , thence to summit 28° , or 3 to 1. The inner slope was 45° . The surfaces of both slopes to the level of low water were paved with rough blocks set at right angles to the slope, and well wedged together, thus presenting as little surface as practicable to the action of the waves. The stone used in this work was obtained from a variety of sources, some trap rock from the Palisades on the Hudson river, greenstone from the northern part of Delaware, and gneiss from different quarries in Delaware. These rocks, though averaging a weight of 175 lbs. to the cubic foot, and employed of the dimensions named, were insufficient to withstand the action of the sea in the course of the construction of the moles. During the winter season, those upon the surface of the work were more or less displaced, and a large piece of 7 tons weight was moved in one storm 18 ft. to the inner slope of the ice-breaker, down which it was lost. At the same time about 200 tons of other heavy stone, that had been thoroughly wedged and compacted together, was torn up and swept over to the inner side. In 1839, according to the report of Major Bache in 1843, the breakwater was in course of construction for 862 yards, and the ice-breaker for 467 yards. Gen. (then Major) J. G. Barnard, in a report of the works made by him in 1853, says: "The last stone was deposited on the work under former appropriations in the year 1839; and since that date a work costing already nearly two millions of dollars, a work in every sense national, has remained in its half finished condition." As long ago as 1843 various plans were proposed for completing the work and rendering the harbor more commodious. Major Bache, in the report before referred to, says: "In order to remedy the defects of the harbor which are caused by the rolling of the sea entering between the works, three modes have been suggested: 1, to cover the gap by extending the ice-breaker; 2, to close the gap by extending the breakwater proper; and 3, to cover the gap by a detached work." He estimates the cost of each of the plans to be as follows: "1, for closing the gap by extending the breakwater, \$551,635; 2, for covering the gap by extending the ice-breaker, \$815,841; 3, for covering the gap by a detached work, \$959,664. To these estimates must be added severally the sum of \$108,921 for raising the existing works to their proper level, and for filling holes in the bottom at their ends." The report of Lieut. Col. J. D. Kurtz, of the engineers, for the year ending June 30, 1870, contains the following: "From July 1, 1869, to the completion of these works in conformity with the present design, Nov. 4, 1869, the work was carried on in furnishing stone by contract as heretofore, the United States performing the labor of placing the large stone in position by days' work. During the fiscal year 10,698 tons of large stone for the

superstructure of these works were received and placed in position, completing 120 running feet of the breakwater and 175 feet of the ice-breaker. In addition, 122 tons of old superstructure have been reset and 2,198 perches of small stone deposited in holes at the extremities of the works and on the sea side of the breakwater opposite the lighthouse. The length of the breakwater on the top is 2,558 ft.; about low-water line the length is 2,603 ft.; length at base, 2,763 ft. The length of the ice-breaker as completed on the top is 1,353 ft.; about low-water line, 1,889 ft.; length of base, 1,601 ft." Col. Kurtz in his report for 1871 says: "The completion of this harbor according to the original project was reported in last year's annual report. This project was devised more than 40 years ago. It is the case here, as in many other government works, that the growth of the country has far exceeded the provision made for its probable wants. Last year's report shows that 15,000 vessels were recorded as visiting this harbor. Adding those entering and leaving without being noted, 20,000 or 25,000 may be taken as the number that used the harbor during the year. Its present capacity is determined by the space that is sheltered by the breakwater proper. This is a straight line nearly half a mile long, and may be taken as the diameter of a half circle behind it, the area of which will represent approximately the sheltered harbor. Northeastwardly of the breakwater is the ice-breaker structure, a quarter of a mile in length, but separated by a gap of nearly equal extent, through which the sea rolls in northwestwardly weather without hindrance. If this were excluded, the sheltered area would be increased three or four fold." Col. Kurtz then presents the plans of Major Bache enumerated above, but is obliged to greatly increase the estimates of cost, viz.: for the first plan, \$1,314,000; for the second, \$1,944,950; and for the third, \$2,278,000. The existing works have cost \$2,127,408. A special board of officers, composed of Gens. Woodruff, Wright, and Newton, and Cols. Kurtz and Craighill, appointed for the purpose of considering the question of further improvements to the breakwater, met in November, 1871, and again in the summer of 1872. At the latter meeting a report was agreed upon favoring the plan of connecting the two moles by extending the breakwater proper until it meets the ice breaker.—Breakwaters are now in course of construction on our northern lakes, which are made of a crib-work of strong timbers filled with stone, and are found to be very effective, and to possess the advantage of economy and facility of construction. It has been found by experience that the cribs will keep in position better if the bottom is formed of latticework, sufficiently open to allow the stones to sift through when the crib is stirred by the waves. The cribs are usually made from 30 to 40 ft. in width, from 60 to 80 ft. in length, and of a depth suited to

the depth of water. They are successively sunk and placed end to end and filled with stone until the work has attained the desired length. There being no tide in these lakes, the top of the crib need not be more than 8 or 10 ft. above the mean water level. Such breakwaters, more or less approaching completion, are in process of construction at Buffalo on Lake Erie, at Oswego on Lake Ontario, at Plattsburgh and Burlington on Lake Champlain, and at other places. Aside from not possessing sufficient strength, these structures would not be practicable on the seacoast on account of the destruction to which the timber would be exposed from attacks of marine worms; but in our fresh-water lakes this objection does not exist. Timber which is placed below the action of the air in fresh water has been found to resist decay for an indefinite time, for centuries at least. If from any cause, however, the framework of the cribs should become weakened, new cribs can be placed on the inner or outer line of the first row, or on both sides, and thus a permanent stone foundation of rubble for a stone breakwater of the ordinary description may be gradually constructed.—The experience acquired by all these breakwaters, and by the action of the waves upon coasts exposed to their greatest violence, establishes the principle that blocks of stone of large dimensions only can be depended upon to retain their places. Mr. James Walker, president of the British institution of civil engineers, advanced the opinion in 1841 that a partial vacuum is created by the action of the waves, and the atmospheric pressure being taken off for an instant, the mass of stone is the more readily influenced by the forces which at the same time solicit it. ("Civil Engineer and Architect's Journal," September, 1841.) If the whole atmospheric pressure were taken off the surface, it would be equivalent to the removal of a weight represented by a column of rock 11½ ft. deep, weighing 175 lbs. to the cubic foot. Under such circumstances, and exposed to the action of a wave 20 ft. high, which is capable of moving masses of rock 7½ ft. deep, stability would be insured only by the addition of this amount to the 11½ ft. But as it is not probable that a large proportion of the atmospheric pressure is ever thus removed, and as 22 ft. is regarded as the maximum height of waves, a depth of solid stone of 15 ft., used as a coping, would probably resist all action of the waves.—The construction and history of the principal breakwaters are fully treated in the great work of Sir John Rennie, president of the institution of civil engineers, upon British and foreign harbors (2 vols. fol., 1854).

BREAM (*pomotis vulgaris*, Cuv.), an acanthopterygian fish, of the family *percida*, of which several species are found in North America, and of which the above, called also sunfish, pond perch, and roach, is the most common. In this genus the borders of the preoperculum have a few denticulations; no teeth on the

palatine bones and tongue, but with minute teeth on the jaws, vomer, and pharyngeals; branchial rays 6; a membranous elongation at



American Bream (*Pomotis vulgaris*).

the angle of the operculum. This beautifully colored species is common in fresh ponds, and is an excellent edible fish; the length rarely exceeds 8 inches. The color above is greenish brown, with rusty blotches irregularly distributed, in some specimens arranged longitudinally; undulating deep blue lines longitudinally across the gill covers; opercular membrane black, with a bright scarlet blotch at its posterior portion; abdomen whitish or yellowish; dorsal, anal, and caudal fins dark brown; ventrals and pectorals yellowish. The body is compressed; the back curves very gradually as far as the posterior extremity of the dorsal fin, and then abruptly gives place to the fleshy portion of the tail; the eyes are large and circular; nostrils double, the anterior tubular; mouth small, teeth minute and sharp; the lateral line assumes the curve of the back; the scales of the body are large, and dented at the base, small at the base of the fins; the pectorals are long, and the caudal emarginate. The bream builds a circular nest along the shore, by removing the weeds and excavating the sand to a depth of half a foot and an extent of two feet; sometimes 20 or 30 occur within the space of a few rods, and often in very shallow water; over the nest the fish hovers, protecting its eggs and young for weeks; it darts against other fishes which come near, and is so intent on its guard duty that a spectator can approach very near, and even handle it. This species is found from Ken-



European Bream (*Abramis brama*).

tucky to the Canadian lakes.—The name of bream is given in Great Britain to several marine species of the family *sparida*, as to the

cantharus griseus, Cuv., and to two species of *pagellus*; also to some malacopterygians of the carp family, as the *abramis brama*, or carp bream. The last named, the best known European fish of this name, is from 2 to 2½ ft. long, proportionally very deep and thin; yellowish white in color, growing darker by age, with a flesh-colored tinge below. It is found generally on the continent and in Great Britain, in lakes and the deepest parts of still rivers, and affords excellent sport to anglers, but its flesh is coarse and insipid.

BREATH. See RESPIRATION.

BREATHITT, an E. county of Kentucky: area, 600 sq. m.; pop. in 1870, 5,672, of whom 181 were colored. It is diversified by hills and forests, and intersected by the north and middle forks of the Kentucky river. Iron and coal are found. The chief productions in 1870 were 166,729 bushels of Indian corn, 8,205 of oats, 4,066 of wheat, 112,224 of potatoes, and 11,658 lbs. of wool. There were 835 horses, 1,494 milch cows, 3,024 other cattle, 7,629 sheep, and 9,055 swine. Capital, Jackson.

BREBEUF, Jean de, a French Jesuit missionary in Canada, born at Bayeux, March 25, 1598, killed in the Huron country, March 16, 1649. He came to America with Champlain in 1626, and proceeded to the Huron country, but was soon recalled by the disasters of the colony, and in 1629 was carried to England as a prisoner. Returning in 1632, he again visited the Huron country, extending his labors to the Neutres on the Niagara. He appreciated the peculiar character of the Indian mind, and thoroughly acquired their language. His influence and success were accordingly great. In the war waged by the Iroquois against the Hurons, the town of St. Louis, where he labored, was taken in 1649, and the missionary and his associate Lalemant were captured and put to death at St. Ignatius with the most fearful tortures. His head is preserved in the base of a silver bust at the convent of the hospital nuns, Quebec. Of his writings we have a Huron translation of Ledesma's catechism, published in Champlain's *Voyages* (Paris, 1632, 1640; Quebec, 1870); the *Huron Relation* in the Jesuit *Relations* of 1635 and 1636, embracing a treatise on the Huron language, translated by Gallatin in the memoirs of the American antiquarian society; and some letters published by Carayon, Paris, 1870.

BRECCIA (Italian), a compound rock composed of angular fragments, which appear to have once existed in other formations. If the fragments, before being reunited, have been rolled into the forms of pebbles, the new rock is called conglomerate or puddingstone. These and breccias are of frequent occurrence among the stratified rocks. The Potomac marble, of which fine specimens are seen in the capitol at Washington, is a breccia of marble, sandstone, and other minerals found in the new red sandstone formation, where it crosses the Potomac. Its various components having different degrees

of hardness, it is a difficult rock to polish, which prevents its coming into general use, as its beauty would render desirable. When breccias are produced from rocks originally stratified in their layers, it is curious to observe how the lines of these layers are preserved in the broken fragments, and may be traced in the various directions in which they are thrown together. Breccias are also prepared artificially. (See CONCRETE.)

BRECHIN, a royal burgh and parish of Forfarshire, Scotland, on the S. Esk, 8 m. from its junction with the sea at Montrose, and 23 m. N. N. E. of Dundee; pop. in 1871, 7,938. It is the seat of a Scottish Episcopal bishop. The cathedral built in the 12th century is now the parish church. Near the church is an ancient round tower, 103 ft. in height, one of the only two in Scotland. Many of the inhabitants are employed in linen weaving.

BRECKENRIDGE, a N. W. county of Kentucky, bordering on Indiana, bounded N. W. by the Ohio river, and having Rough creek for its S. limit; area, 450 sq. m.; pop. in 1870, 13,440, of whom 1,682 were colored. The surface consists of undulating uplands. The soil has a basis of red clay and limestone, and is fertile and well watered. Sinking creek in this county plunges below the surface, and is lost for 5 or 6 m., when it emerges from the ground, and flows into the Ohio. Penitentiary cave, near this creek, is said to contain chambers of vast size. The Tar and Breckenridge White Sulphur Springs are in this county. The Breckenridge coal is found here. The chief productions in 1870 were 57,921 bushels of wheat, 526,080 of Indian corn, 129,703 of oats, 22,918 of potatoes, 3,476 tons of hay, 139,207 lbs. of butter, 30,081 of wool, and 3,338,471 of tobacco. There were 3,872 horses, 2,565 milch cows, 4,115 other cattle, 13,525 sheep, and 25,386 swine. Capital, Hardinsburg.

BRECKENRIDGE, John, D. D., a Presbyterian clergyman, born at Cabell's Dale, Ky., July 4, 1797, died there, Aug. 4, 1841. He graduated at Princeton college in 1818. While at college he joined the Presbyterian church, and though his father, United States attorney general under Jefferson, had designed him for the law, he preferred the ministry. In 1822 he was licensed by the presbytery of New Brunswick to preach, and shortly after served as chaplain to congress. Having been ordained to the ministry, he was installed pastor of a church in Lexington, Ky. After remaining in this charge four years, during which time he established a religious newspaper entitled "The Western Luminary," he was called to the second Presbyterian church in Baltimore, as colleague with the Rev. Dr. Glendy. Appointed in 1831 secretary and general agent of the Presbyterian board of education, he removed to Philadelphia, and occupied this post for six years, when he was elected by the general assembly professor in the Princeton theological seminary. During his connection with the seminary he engaged

in two public controversies, one written and the other oral, with the Rev. John Hughes of Philadelphia (afterward archbishop of New York), which were published in book form. He took an active part in the controversies which agitated the Presbyterian church, as a leader of the Old School party. All his sermons, speeches, and arguments were extempore, yet correct and logical. In 1838, upon the organization of the board of foreign missions, he was elected its secretary and general agent, and devoted his entire time and energy to the superintendence of its operations till 1840, when his health gave way. At the time of his death he was pastor elect of a Presbyterian church in New Orleans, and president elect of Oglethorpe university, Georgia.

BRECKENRIDGE, John Cabell, an American politician and soldier, born near Lexington, Ky., Jan. 21, 1821. He was educated at Centre college, Danville, studied law at the Transylvania institute, and settled at Lexington. At the breaking out of the war with Mexico he was elected major of the third regiment of Kentucky volunteers, but had little opportunity for active service. After the war he was elected to the house of representatives of Kentucky, and in 1851 was chosen to congress, and in 1853 was reelected after a violent and protracted contest. During the first session of the 33d congress, in the course of the discussion of the Kansas-Nebraska bill, he was involved in a personal altercation with Mr. F. B. Cutting, a member from New York, leading to the preliminaries for a duel, which, however, did not take place. Upon the accession of President Pierce he was offered the ministry to Spain, but declined it. In 1856 he was elected vice president, in conjunction with Buchanan as president. In 1860 the disunion delegates in the democratic national convention, having separated from the supporters of S. A. Douglas, nominated Mr. Breckenridge for president, and he received the electoral votes of all the southern states except Virginia, Kentucky, Tennessee, and Missouri. In the same year he was elected United States senator. After defending the southern confederacy in the senate, he went south, entered the army, and rose to the rank of major general. He was repulsed in an attack on Baton Rouge in August, 1861; commanded a corps under Bragg at Stone river at the end of 1862, and at Chickamauga in September, 1863; defeated Sigel at Newmarket in May, 1864; participated in Early's advance on Washington in July of that year, and shared in his defeat near Winchester in September. In January, 1865, he was appointed confederate secretary of war. After the surrender of Gen. Lee he went to Europe, whence he returned in 1868, and has since lived in Kentucky.

BRECKENRIDGE, Robert Jefferson, D. D., LL. D., uncle of the preceding, and brother of the Rev. John Breckenridge, an American divine, born at Cabell's Dale, Ky., March 8, 1800,

died at Danville, Ky., Dec. 27, 1871. He studied successively in Princeton, Yale, and Union colleges, and practised law in Kentucky for eight years from 1823, being several times a member of the state legislature. In 1829 he joined the Presbyterian church, and in 1832 was ordained pastor of the first Presbyterian church in Baltimore, in which position he remained 18 years. In 1845 he was elected president of Jefferson college, Pennsylvania, where he remained two years, at the same time being pastor of the church in a neighboring village; after which he removed to Kentucky, and became pastor of the first Presbyterian church in Lexington, and superintendent of public instruction for the state. In 1853 he was elected professor of theology in the seminary at Danville, Ky. During the controversies which led to the disruption of the Presbyterian church, he became the acknowledged leader of the Old School. It was chiefly through his agency that the managers of the American Bible society, after voting to adopt the revised edition of the Bible as their standard, subsequently receded from that action. He was the principal author of the common school system of Kentucky. In the anti-slavery discussion he took a decided course in opposition to extreme opinions on either side, and advocated the passage of a law for manumitting the slaves in Kentucky. When the civil war broke out he took a firm stand in favor of the Union, but he wrote against Mr. Lincoln's emancipation proclamation. In 1864 he presided over the republican national convention which renominated Mr. Lincoln for the presidency. While in Baltimore he edited the "Religious and Literary Magazine," and at Danville the "Danville Review." He published two works of foreign travel (1 vol., 1839; 2 vols., 1845); "Papism in the United States" (1841); "Internal Evidences of Christianity" (1852); "The Knowledge of God objectively Considered" (1857); and "The Knowledge of God subjectively Considered" (1859).

BRECKNOCK, or **Brecon**, an inland county in the south of Wales, traversed by the Black mountains and other ranges, containing the Van or Beacon mountain, 2,862 ft. high, and noted for its magnificent scenery; area, 716 sq. m.; pop. in 1871, 59,905. The river Wye bounds it on the N. E. and N., the Usk flows through it, and near its centre is Brecknock Mere, or Llans-afeddar, one of the largest lakes in S. Wales. The soil on the mountains is poor, but the valleys yield grain, potatoes, and turnips in abundance, and these, together with timber, wool, cattle, and dairy produce, constitute the chief resources of the county. About half of the land is under cultivation. The mineral productions, embracing coal and iron, are inconsiderable. There are iron works in the E. part, but they draw both ore and fuel principally from other counties. The manufactures are coarse woollens and worsted stuffs.

BRECKNOCK, **Brecon**, or **Aber-Honday**, a parliamentary and municipal borough and market

town of Wales, capital of the county of its own name; pop. in 1871, 5,845. It is situated in a healthy and beautiful valley, at the confluence of the rivers Honddu or Hondey, Tarrell, and Usk, the first of which is crossed by three bridges, and the last by one. It has three long avenues intersected by a number of shorter ones all well kept and paved, and most of them straight. The public walks are remarkably beautiful. The Brecknock and Abergavenny canal, 35 m. long, joins with the Monmouth canal, 15 m. long, which connects it with the Usk; and a railway with Merthyr Tydvil, 14 m. S. The town was once surrounded by walls, which were demolished by the inhabitants during the last civil war, in order to avoid a siege. Brecknock was founded about 1092, when a castle was built by Bernard Newmarch, a relative of William the Conqueror. Its ruins are included in the grounds of the Castle hotel.

BREDA, a strong town and fortress of the Netherlands, province of North Brabant, at the junction of the rivers Mark and Aa, 24 m. W. S. W. of Bois-le-Duc; pop. in 1868, 15,265. A canal connects the town with the Maas. Woollen goods, carpets, and tapestry are manufactured here; there are also tanneries and breweries. The town is noted for its military and naval academy. The principal Protestant church contains many interesting monuments and works of art. During the war of the reformation, of the Spanish occupation of the Netherlands, and the later wars between the Dutch, Spaniards, and French, it was a constant object of contention. It was taken by surprise in 1581, and was recaptured by a skilful stratagem in 1590 by Maurice of Nassau. In 1624-'5 it endured a siege of ten months by Spinola, and again one of four by Henry of Orange, its resistance in neither instance being successful. During the French war of the revolution it was taken by Dumouriez in 1793, but liberated in consequence of his losing the battle of Neerwinden; in 1794 it was besieged by Pichegru, and held out until the whole of Holland surrendered; and lastly in 1818, when on the approach of the Russian vanguard the French garrison sallied against Benckendorff, the townspeople rose and shut the gates on the defenders, and finally surrendered it to the allies for Holland. The famous declaration of Breda, made by Charles II. to parliament previous to his restoration, May 1, 1660, promised a general amnesty, liberty of conscience, a settlement of forfeited estates, and liquidation of arrears to the army. The peace of Breda, between Holland, England, France, and Denmark, was concluded July 31, 1667.

BREDERODE, **Hendrik van**, count, a patriot of the Netherlands, a descendant of the old sovereign counts of Holland, born in Brussels in 1531, died at the castle of Hardenberg, in Germany, in 1563. He was one of the leaders in the rising against the Spanish domination in the Netherlands. In 1562 he made himself conspicuous by his wild demonstrations against

Cardinal Granvelle; and in 1565, at a banquet given to Egmont, he grossly insulted the archbishop of Cambray, who was one of the guests. Brederode, Charles de Mansfeld, and Louis of Naasau were the first three signers of the original protest ("the compromise of Breda"), made early in 1566, against the inquisition. He was chosen as bearer of the memorable petition addressed by the states general to the regent, Margaret of Parma, in which capacity he made his entry into Brussels April 8. On the 8th he gave a banquet, at which the healths of himself and of Egmont and the prince of Orange were drunk. Berlaymont, the state councillor, had told the duchess of Parma that the signers of the petition were a parcel of beggars. This was reported at the banquet, whereupon Brederode exclaimed, "They call us beggars! let us accept the name. We will contend with the inquisition, but remain loyal to the king, even if compelled to wear the beggar's sack!" He then hung a leathern wallet, the badge of a mendicant, around his neck, and gave the toast, *Vivent les gueus*—"Long live the beggars!" which became the war cry of the Dutch uprising. During the autumn and winter of 1566 Brederode excited disturbances near Valenciennes in order to make a diversion in favor of that city, which was then besieged. In January, 1567, he established his headquarters at Vianen, where he had seigniorial rights. He strengthened its fortifications, removed all statues and emblems from the Roman Catholic churches, and assembled turbulent bands, keeping the Spanish authorities in perpetual apprehension. Early in February he visited the prince of Orange at Breda, in order to inform him of the new petition which he had prepared for presentation to the duchess of Parma. The duchess declining to grant him letters of safe-conduct to Brussels, he forwarded the document to her from Antwerp. It claimed the exercise of the reformed religion as a right, and insisted upon the dismissal of the Spanish forces and the faithful fulfilment of the concessions of August, 1565. The regent ordering him to leave Antwerp, he accepted her threatening answer as a formal declaration of hostilities, and began to enlist troops in that city and its vicinity, apparently with a view of making an attempt upon the island of Walcheren. He anticipated the formal proclamation of the prince of Orange against these enlistments by removing the scene of his operations to Holland, saying that he took the field to relieve Valenciennes, and dictate peace in Brussels. But he remained at Vianen and Amsterdam after the disastrous expedition of Marnix de Tholouse to Middelburg, which he had planned, but in which he had not assisted; and in Amsterdam he disgusted even the reformers by spending his time in singing the beggars' songs, without showing any capacity for serious enterprises. At length, in March, 1567, the regent demanded that Brederode should be

expelled from Amsterdam; whereupon he bullied her secretary, and denounced the duchess as a tyrant. But early in April, after hearing of the success of the Spaniards, he begged Egmont to intercede for him with the regent; but as she would not accord him any terms, he set out for Emden in the night of April 25. He died before the lapse of a year, of disappointment and intemperance. His followers dispersed after his departure from the Netherlands, many of them being captured and put to death. His daughter recovered his estates after the restoration of peace; but as she left no issue, they passed into the hands of a junior branch of the family, which became extinct in 1679, when they passed to the counts van der Lippe, who in 1727 sold the principal domain of Vianen to the states general. Mr. Motley charges Brederode with having disgraced his party by his buffoonery, and with having done nothing for the cause of freedom. M. C. van Hall, however, had previously written in his defence, *Hendrik Graaf van Brederode verdedigd* (1845); and P. Scheltema published *Hendrik van Brederode te Amsterdam in 1567* (1847).

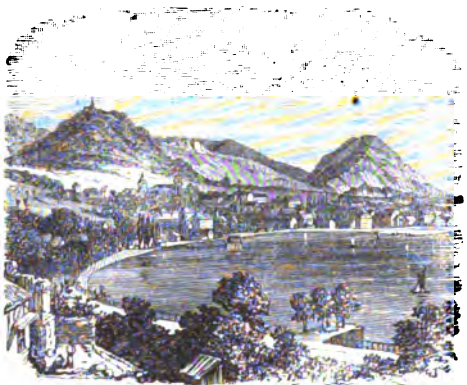
BREDOW, Gabriel Gottfried, a German historian, born in Berlin, Dec. 14, 1778, died in Breslau, Sept. 5, 1814. He was a graduate of Halle, forsook theology to devote himself to the study of the geography and astronomy of the ancients, on which he published several works, and was professor in different institutions, and finally in the university of Breslau. His historical works met with remarkable success, especially the *Merkwürdige Begebenheiten aus der allgemeinen Weltgeschichte*, and the *Umständliche Erzählung der merkwürdigsten Begebenheiten aus der allgemeinen Weltgeschichte*; the former passed, between 1804 and 1852, through 26 editions, and the latter through 18.

BRÉE. I. **Nathien Ignace van**, a Belgian painter, born in Antwerp, Feb. 22, 1778, died there, Dec. 15, 1839. He was a pupil of Schaaeken in Antwerp, and of Vincent in Paris, and became early distinguished by his rapid execution of large historical pictures. His most celebrated painting, representing the famine of Leyden in 1576, is in the town hall of that city. His "Johanna Sebus" was presented in 1858 to the Prussian town of Cleves, and his "Rubens" is in the possession of the grand duke of Saxe-Weimar. His portraits are also admired. He excelled as a lithographer and sculptor, and was director of the academy of fine arts at Antwerp. II. **Philippe Jacques van**, brother and pupil of the preceding, born in Antwerp in 1786, died there in 1840. He completed his studies in Paris and Rome, and produced many historical and other paintings, including "Oriental Travellers," "A Spanish Nun," "Atala," "Queen Blanche with her Child, the future St. Louis," "Maria de' Medici and Louis XIII. in the presence of Rubens," "Mary Stuart on the Eve of Execution," "Petrarch surprised by Laura," and "The Abdication of Charles

V." His "Interior of St. Peter's" was purchased by the Belgian government.

BREEDE (Dutch, broad), a river of Cape Colony, S. Africa, which rises in a mountain basin, and breaking through the mountains, takes a S. E. course to the sea, at Port Beaufort. It is one of the deepest and largest rivers of the country, but navigation is impeded by a bar at its mouth.

BREGENZ (anc. *Brigantium*), a town of Austria, capital of Vorarlberg, situated at the E. end of the lake of Constance, near the mouth of the river Bregenz; pop. in 1870, 3,686. It is well built, and has considerable trade. Wooden houses ready made for the Alpine districts of Switzerland, and vine poles for the vineyards on the lake, are exported in large numbers. Not far from the town is the Bregenzer Klause, a pass formerly fortified. The Bregenzer Wald is a spur of the Allgäu Alps. The lake of Bregenz is the name given to the S. E. portion of



Bregenz.

the lake of Constance. A treaty between Austria, Württemberg, and Bavaria against Prussia, in reference to the Hesse-Cassel imbroglio, was concluded here, Oct. 12, 1850. A conference for the regulation of the navigation of the lake of Constance was held here by the riparian powers in October, 1855.

BREGUET. I. **Abraham Louis**, a Swiss watchmaker, born at Neuchâtel, Jan. 10, 1747, died Sept. 17, 1823. • He established a manufactory in Paris, and was appointed chronometer maker to the navy, member of the bureau of longitudes, and member of the institute. His pocket chronometers, marine timepieces, sympathetic pendulums, metallic thermometers, and mechanism of telegraphs, as established by Chappe, attest his skill. II. **Louis**, grandson of the preceding, born in Paris, Dec. 22, 1804. In 1826 he was placed at the head of the chronometer department of the navy founded by his grandfather. He soon turned his attention toward the application of the physical sciences, and especially to the electric telegraph. The timepieces constructed by him maintain the reputation gained by his father and grandfather.

BREHM, Alfred Edmund, a German naturalist and traveller, born at Renthendorf, Feb. 2, 1829. He studied under his father, Christian Ludwig Brehm, an eminent ornithologist (1787-1864). After making zoological collections during five years' travel in Egypt, Nubia, and eastern Soodan, he studied at Jena and Vienna, subsequently visited Spain, Norway, and Lapland, and in 1862 N. Abyssinia, in company with Duke Ernest of Saxe-Coburg-Gotha. He was director of the zoological gardens at Hamburg from 1863 to 1867, when he removed to Berlin, where he established the famous aquarium. He wrote *Das Leben der Vögel* (Glogau, 1860-'61; 2d ed., 1867; English translation, "Bird Life," by H. M. Labouchere and W. Jesse, 4 parts, London, 1872); *Illustriertes Thierleben* (6 vols., Hildburghausen, 1868-'9); and *Gefangene Vögel* (3 vols., Leipzig, 1870 et seq.). Among his books of travel are *Reiseskizzen aus Nordostafrika* (3 vols., Jena, 1855-'68), and *Ergebnisse einer Reise nach Habesch* (Hamburg, 1868).

BREHON LAWS, the ancient body of laws under which the Celtic Irish lived for many ages, to which they clung with reverence until the beginning of the 17th century in at least one province of Ireland, Ulster, and which very gradually gave place to English laws founded on the feudal system, in proportion as British arms and policy completed the conquest of the island. The Brehon laws were not properly a code, but were simply the whole body of ancient legal maxims and usages as administered by the brehons, who were the judges of the land. Brehon (*breithamh*) signified a judge or professor of law; and the root is the Irish word *breith*, judgment or right. The brehons formed a kind of college or faculty; and each great clan had its own brehons, whose office was hereditary, not in the feudal sense, by descent from eldest son to eldest son, but in the Gaelic sense, in which the chiefs of clans and high-kings, or *ardrighs* of Ireland, came to their own offices and dignities. Much light has been thrown upon the whole subject within a few years past by the labors of a government commission. As early as 1783, Edmund Burke suggested the propriety of collecting and publishing in English or Latin these remnants of a former civilization, but it was not till 1852 that the English government consented to lend its aid to the work. In that year, at the special instance of Drs. Todd and Graves, both Protestant clergymen, a commission was issued appointing them and several other scholars "to direct, superintend, and carry into effect the transcription and translation of the ancient laws of Ireland, and the preparation of the same for publication," with power to employ proper persons to execute the work. The persons selected by the commissioners were Dr. O'Donovan and Prof. O'Curry, whose discharge of the duties so assigned them ended only at their death. They were succeeded by others, whose labors are not yet ended; and private

associations have also been busy upon one department of the multifarious materials; so that we have now these two authentic records, edited and annotated with great care: "The Ancient Laws of Ireland," of which two volumes have appeared, the first in 1865; and *Senchus Mor* ("Great Law Compilation") and *Leabhar na g-Ceart* ("The Book of Rights"), published by the Celtic society, with extremely valuable notes by the late John O'Donovan (Dublin, 1847). The two first mentioned volumes can scarcely be called even compilations, because, as their editors avow, they consist of mere fragments, decisions of the brehons, rules and maxims of law, gathered together out of many more or less imperfect manuscripts, of various ages. The principal materials used by the translators are thus described in the preface to the first volume: "I. A comparatively full copy among the manuscripts of Trinity college, Dublin. II. An extensive fragment of the first part, 432, of the Harleian manuscripts in the British museum. III. A large fragment of the latter part among the manuscripts of Trinity college, Dublin. IV. A fragment among the manuscripts in Trinity college." These materials, however, being used with due discrimination, are enough to present in a tolerably consistent form an authentic series of the text books, a much larger, older, and clearer system of the institutions which once prevailed over all western Europe, than any other nation has yet been able to produce from its own archaic resources. Besides the works named above, the student who desires further information concerning the various texts, their origin, their comparative age, and their preservation, may consult O'Curry's published lectures "On the MS. Materials of Ancient Irish History," as delivered in the Catholic university of Dublin.—The principles of the Brehon law were essentially distinct from and incompatible with the feudal; so that when those two systems came face to face on the same small island, it was inevitable that one of the two must succumb. The main basis of every national system of law is of course its land tenure. The possession and inheritance of landed property was regulated by the law called gavelkind (*gavail-kinne*), an ancient Celtic institution, but common to Britons, Anglo-Saxons, and others. By this law, inherited or other property was divided equally between the sons, to the exclusion of the daughters, except in default of heirs male, when females were permitted a life interest. The tenure of land was a tribe or family right, and the whole system of government was far more patriarchal than Teutonic—an indication of an eastern origin. All the members of a tribe or family had an equal right to their proportionate share of the land occupied by the whole. This system created a mutual independence and self-consciousness of personal right and importance, strongly at variance with the subjugation of the Germanic and An-

glo-Norman vassal. One of the most noticeable peculiarities of the Brehon law is the compensation for murder, and for other crimes and wrongs proportionally, called *eric*. This, however, was common to many nations. Its origin is ascribed to the Germans, but the institution was probably far more ancient. We find the *eric* forbidden in the oldest code of laws in existence; and hence it must have existed at an early period of the world's civil history. The law of succession, called *tanaisteacht*, or tanistry, is one of the most peculiar of the Brehon laws. The eldest son succeeded the father to the exclusion of all collateral claimants, unless he was disqualified by deformity, imbecility, or crime. In after ages, by a compact between parents or mutual agreement, the succession was sometimes made alternative in two or more families. The eldest son, being recognized as presumptive heir, was denominated *tanaiste*, that is, minor or second; while the other sons, or persons eligible in case of failure, were termed *righdhamhua*, which literally means king material, or king-makings. The *tanaiste* had a separate establishment and distinct privileges. The primitive intention was that the best man should reign; but practically it sometimes ended in might being taken for right. A very large portion of the *Senchus Mor* relates to the law of distress. The movable wealth of the people consisted mainly of cattle and sheep, a kind of riches easily carried off; and as debts and *erics* were collected chiefly by distraining on the lands of the debtor, the stronger might be easily tempted to oppress the weaker, either by distraining wrongfully or by denying payment and resisting a lawful distress with the strong hand. Therefore we naturally find numerous regulations governing the exercise of this right. Two points are noticeable in this: First, the careful and accurate administration of justice which is indicated by the details of these legal enactments; second, the custom therein sanctioned of the creditor fasting upon the debtor, a custom which still exists in Hindostan. Thus, in some cases, the creditor fasts on the debtor until he is compelled to pay his debt, lest his creditor should die at the door; in other cases, the creditor not only fasts himself, but also compels his debtor to fast, by stopping his supplies. Elphinstone describes this as used even against princes, and especially by troops to procure payment of arrears. This singular method of levying money due is called in Irish *acharitan*, and is known in Cabool and Afghanistan as *dherma*. The student of these laws will find them pervaded on the whole by a spirit of humanity and gentleness. We find this more particularly the case in studying the laws regulating the domestic relations of the family, which, being the unit of which society is but an aggregate, is the most vital and important part of all human arrangements. Ample provision is made for the mutual protection of husband and wife, and the reciprocal rights and

duties of parent and child are minutely defined and carefully guarded. There is also found a universal respect and tenderness toward women, a thing rare in that age. Here is one passage from the *Senchus*: "In the connection of equal property, if with equal land and cattle and household stuff, and if their marriage state be equally free and lawful, the wife in this case is called the wife of equal rank. The contract made by either party is not a lawful contract without the consent of the other, except in cases of contracts tending equally to the welfare of both; such as the alliance of co-tillage with a lawful tribe when they (the couple) have not the means themselves of doing the work of ploughing; the taking of land; the collection of food; the gathering for the festivals; the buying of breeding cattle; the collecting of house furniture; the collecting of litters of pigs; the buying of stacks and other necessities. . . . Each of the two parties has the power to give refection and feast according to their respective dignity." The maxims of law relating to the enforcement of the rights of women are very precise. In case of separation, adequate protection was thrown around the wife's right of property. If her property was equal to that of her husband at the time of marriage, she took an equal moiety of the collective lands, goods, and chattels, and in case of dairy produce and the proceeds of the loom two thirds. If the property had originally belonged wholly to the husband, the wife was entitled to one third on her separation; and if it had been her own before marriage, to two thirds. The institution of the family, on which all clanship rests, is not only found here surrounded by much sanctity and careful guardianship, but the family relation is even extended outside of the mere household, by two institutions called *fosterage* and *gossipred*. When a child was put out to be fostered in another family of the same clan, he grew up with two mothers and two sets of brothers and sisters, and often was more attached to the foster

mother and foster brother than to those of his own household. It was a relation well known in other nations of the west, especially among those other Gael, the Highlanders of Scotland; but nowhere was it regulated by such elaborate laws, as to the food, clothing, and education of the foster child, and its training, if a boy, in all manly exercises, if a girl, in feminine accomplishments suitable to their degree, as it may here be found regulated by the brehons. *Gossipred*, or the relation between a child and his godfathers and godmothers, was also a substantial and legal tie, inferring obligations, not a mere sentimental notion calling only for christening presents. Then there was a literary fosterage, in use only among the professional classes, that is, the *fileas*, *ollamhs*, and *brehons*; concerning which here is a curious extract: "The social connection that is considered between the foster pupil and the literary foster father is, that the latter is to instruct him without reserve, and to prepare him for his degree, and to chastise him without severity, and to feed and clothe him while he is learning his profession, unless he obtains it from another person, and from the school of Feniús Forsaidh onward this custom prevails; and the foster pupil is to assist his tutor in poverty and to assist him in his old age, and the honor price of the degree for which he prepares him and all the gains of his art while he is learning it, and the first earnings of his art after leaving the house of his tutor, are to be given to the tutor."

BREIDENBACH, Bernhard von, a priest of Mentz, who visited Palestine about 1483, died in 1497. On his return to Germany he wrote in Latin an account of his travels, which was published in several editions before his death. This work was accompanied by engravings of the scenery, costumes, and animals of the Holy Land, and contained several oriental alphabets, said to have been the first ever printed.

BREISACH. I. Alt, a town of Germany, in Baden, on the Rhine, 12 m. W. of Freiburg;



Alt Breisach.

pop. in 1867, 3,272. It is well fortified, and was formerly a bulwark of Germany on the upper Rhine. It has a fine old cathedral, and the inhabitants are engaged in shipping and in the cultivation of tobacco. The town was captured by Bernhard of Saxe-Weimar in 1638 after a long siege, ceded to France in 1648, and restored to Germany in 1697. The French again held it from 1703 to 1715. **II. Neu** (Fr. *Neuf-Brisach*), a town of Germany, in Alsace, opposite the preceding, about 2 m. W. of the Rhine, on the Rhône and Rhine canal; pop. in 1866, 1,981. After Alt Breisach had been restored to the German empire, Neu Breisach was, by order of Louis XIV., strongly fortified by Vauban. Fort Mortier, 2 m. N. E. of Neu Breisach, capitulated to the German army on Nov. 7, 1870, and three days later the fortress itself surrendered, when 100 officers, 5,000 men, and 100 pieces of ordnance fell into the hands of the victors.

BREISGAU, or *Brigau*, an old division of Germany, in the S. W. of Swabia. For a long time it was under the authority of the counts of Breisach, and subsequently under the dukes of Zähringen. It was afterward added to the Austrian dominions, and by the treaty of Presburg in 1805 it was ceded to the elector of Baden, excepting a small portion assigned to Württemberg, and subsequently acquired by Baden. It contains 17 towns, among them Alt Breisach and Freiburg (Freiburg im Breisgau). Iron, copper, and lead are extensively worked in Breisgau, and the forest districts are famous for the manufacture of clocks and other articles in wood.

BREISLAK, *Scipione*, an Italian geologist, of German parentage, born in Rome in 1748, died in Milan, Feb. 15, 1826. He has been called abbé from having been destined for the church, though he never became a priest. He early filled a scientific chair at Ragusa, subsequently became professor at the *collegio Nazareno* in Rome, made considerable researches in the volcanic regions of Italy and France, spent some time in Paris with Cuvier, and was appointed by Napoleon director of the powder and saltpetre works in Italy. His works, in which he opposed the system of the Neptunists without indiscriminately accepting that of the Vulcanists, include *Topografia fisica della Campania* (Florence, 1798); *Istituzioni geologiche* (Milan, 1818); *Descrizione geologica della Lombardia* (1822); and *Sopra i terreni tra il Lago Maggiore e quello di Lugano* (1838). His rich geological collections he bequeathed to the Borromeo family.

BREITHAUP, *Joachim Justus*, a German clergyman, born at Nordheim, Hanover, in 1658, died March 16, 1732. He was professor at Halle from 1691 to 1705, and published *Institutiones Theologicae* (1694), *De Credendis et Agendis* (1716-'32), and several hymns which were translated into English by John Wesley.

BREITKOPF, *Johann Gottlob Immanuel*, a German printer, born in Leipsic, Nov. 23, 1719,

died there, Jan. 28, 1794. His father was a bookseller, printer, and type founder, and brought up his son as such. The latter changed the form of the types then in general use, improved the composition of type metal and the mechanism of printing presses, and endeavored, unsuccessfully, to print music, geographical maps, and portraits with movable type. He wrote an essay on the history of printing, and labored for several years on a more elaborate work on the same subject, which he did not live to complete; but he published several other works, including one on bibliography and bibliophily (1798). His establishment was continued by his son, Christoph Gottlob, in partnership with Gottfried Christoph Härtel, under the firm name of Breitkopf and Härtel.

BREMEN, one of the three free cities of Germany, forming with its territory a state of the empire, situated on the Weser, 80 m. from its mouth, and 57 m. S. W. of Hamburg; area of the state, 99 sq. m.; pop. in 1871, 122,565, of whom 82,950 resided in the city of Bremen, 10,594 in the town of Bremerhafen, 3,554 in



Statue of Roland.

the town of Vegesack, and 25,467 in the rural districts. More than 97 per cent. of the inhabitants are Protestants. The new and the old town, on opposite banks of the river, are connected by handsome bridges. No dredging being used to deepen the channel, the bed of the river continually rises by the deposits brought down; and the dike is consequently raised year by year, so that in time the bottom of the river will be on a level with the streets. Among the noteworthy buildings are the cathedral, built in 1050 by Archbishop Adalbert, with a tower 324 ft. high, having one of the finest organs in Germany, and a vault (*Bleikeller*) which has the property of preserving free from decomposition, after the lapse of ages, bodies interred in it; the church of St. Anscarius; the council house, with the celebrated wine cellar

and casks, called the rose and the twelve apostles, filled with fine hock, some of which is a century and a half old; the Roland statue, 18 ft. high; the guildhall, called the *Schütting*;



Council House.

the theatre, the post office, the exchange, and the museum. The statue of Gustavus Adolphus was placed in one of the public squares in 1856. Among the other public buildings are the commercial school, two orphan asylums, the infirmary, the naval academy, the institution for deaf mutes, the normal school, the drawing school, the art gallery, the observatory (founded by the astronomer Olbers, a native of the town, to whom a monument was erected in 1850), and the gymnasium. The "Library Association" undertakes to insure that all libraries belonging to the city or to special corporations are accessible to the entire population. There is a merchants' exchange, a bank of issue, a discount bank, several insurance companies, a commercial court, and public institutions for the security and comfort of emigrants. A Lloyd for northern Germany (*der Nord-Deutsche Lloyd*), after the plan of the *Lloyd Austriaco* of Trieste, was founded in 1856. Ship building is carried on to a greater extent than in any other German port. Sugar refineries, iron foundries, lard-boiling, manufactures of oil, soap, and sail cloth, and cotton spinning, are also carried on. More tobacco is imported here than at all the other German ports, the quantity amounting to about 24,000,000 lbs. a year, and cigars are largely manufactured.—The improvements in the navigation of the Weser and its confluenta, and the railway connections, have placed Bremen in direct communication with the heart of Germany. Its prosperity depends mainly upon its trade with the rest of the empire, and with the United States and Great Britain. The gold thaler, in which accounts are kept, is equivalent to 79 cents, American coin. The estimated revenue in 1871 was 2,281,463 thalers; expenditures 2,052,775, about one half on account of the public debt, amounting in 1870 to 11,584,513 thalers, of which 4,000,000 were a railway loan, paying 4½ per cent. interest. The com-

merce in 1870 was: exports, 94,920,000 thalers; imports, 90,950,000; of which were with the German Zollverein, exports 41,980,000, imports 28,370,000; the United States, exports 17,520,000, imports 29,960,000; Great Britain, exports 4,120,000, imports 12,100,000; Hamburg, exports 1,870,000, imports 4,050,000; Austria, exports 7,890,000, imports 2,110,000; Russia, exports 6,760,000, imports 1,040,000; Holland and Belgium, exports 2,550,000, imports 1,460,000; France, exports 440,000, imports 540,000; the Antilles, exports 940,000, imports 2,050,000; the trade with other countries being small. The average annual exports from 1861 to 1870 were 78,610,000 thalers, imports 82,920,000; the largest amount was in 1869, when the exports were 94,920,000, imports 103,310,000. In 1869 the total trade with transatlantic ports was, exports 20,813,082 thalers, imports 38,687,538; with European ports and the Levant, 18,516,102; by land and river, exports 52,985,587, imports 38,816,220. In 1869 there were plying to and from the port of Bremen 274 vessels, of 238,148 tons, and 26 ocean steamers, of 51,725 tons. In 1868 the privilege was conceded to Bremen and Hamburg of remaining free ports, exempt from the German customs limits, in consideration of which the state engaged to pay to the Zollverein a tax proportioned to its trade. Bremen is the chief German port for emigration, the emigrants going almost entirely to the United States. In 1843 there were 9,844 emigrants; 1844, 19,863; 1845, 31,158; 1846, 32,372; 1847, 33,628; 1848, 29,947; 1849, 28,629; 1850, 25,838; 1851, 37,493; 1852, 58,551; 1853, 58,111; 1854, 76,875; 1855, 81,550; from 1856 to 1860, average 82,450; 1861-5, average 20,397; in 1866, 61,877; 1867, 73,971; in 1868, 66,433; in 1869, 63,519. The total number of emigrants from 1880 to 1870 was 1,196,363.—Bremen is connected by railways with the whole interior of Germany, and also with Bremerhafen, 80 m. distant, which is now its port; for the Weser having become too shallow for large vessels to ascend, it became necessary to abandon Vegesack, which had been the port since the 16th century.—Bremen has one vote out of 58 in the Bundesrath, or federal council of the empire, and one out of 382 in the Reichstag or diet of the empire. Its local government is composed of a senate of 18 members, of whom at least 10 must be lawyers and 5 merchants; and a *Bürgerschaft* or assembly of the citizens, consisting of 150 members, of whom 16 are chosen by the citizens who have attended the university, 48 by the merchants, 24 by the trades, 30 by the other inhabitants of the city, 6 by Vegesack, 6 by Bremerhafen, and 20 by the rural districts. The assembly is divided into committees, and is presided over by members of the board of aldermen, in whom is vested a portion of the executive power. Two burgomasters, elected by and from the senate, direct the affairs of state, through eight departments: foreign affairs, church and education,

justice, finance, police, medical and sanitary administration, military affairs, commerce and shipping; all the ministers are senators. In 1854 a law was enacted admitting Jews to the right of citizenship.—Bremen was founded by Charlemagne in 788, and endowed with a bishopric, which was subsequently raised to an archbishopric. In the course of time the city increased in strength, wrested the temporal power from the hand of the church, and became one of the early participants in the league of the Hanse towns. It conquered a number of Norwegian and Livonian ports, founded Riga in 1158, took part in the conquest of Prussia, extorted commercial privileges from all ports between Bremen and Amsterdam, from England and Flanders, and subjected to its control a large strip of land on both banks of the Weser. In common with Hamburg, it purged the North sea of pirates. It was one of the earliest cities to decide for Protestantism, but religious dissensions within the city, and finally the thirty years' war, brought the archiepiscopal territory under Swedish sway, with the title of duchy. The city itself was twice unsuccessfully besieged by the Swedes (1654 and 1666). Both the duchy and city were conquered by the Danes in 1712; the former was subsequently acquired by Hanover, and the latter restored to its independence. In the Napoleonic wars, when the city suffered much, its volunteer militia were among the earliest and bravest defenders of German independence. The treaties of Vienna made it a member of the Germanic confederation, after the dissolution of which in 1866 it joined the North German union, and four years later the German empire.

BREMER, a N. E. county of Iowa, intersected by the Cedar and Wapsipicon rivers; area, 480 sq. m.; pop. in 1870, 12,528. The Cedar Falls and Minnesota railroad traverses the county. The soil is of good quality, well watered, and abundantly supplied with timber. The chief productions in 1870 were 527,638 bushels of wheat, 423,862 of Indian corn, 887,658 of oats, 15,493 of barley, 77,349 of potatoes, 26,550 tons of hay, 20,101 lbs. of wool, and 400,791 of butter. There were 4,946 horses, 5,101 milch cows, 5,223 sheep, and 9,424 swine. Capital, Waverley.

BREMER, Fredrika, a Swedish novelist, born near Abo, in Finland, Aug. 17, 1801, died at Arsta, near Stockholm, Dec. 31, 1865. Her father was a wealthy merchant, and on the annexation of Finland to Russia in 1809 removed with his family to Sweden. Fredrika was carefully educated, resided for some time in Norway with the countess Sonnerhjelm, and to complete her education was sent for a year to Paris. On her return she became a teacher in a female academy at Stockholm. She began at the age of eight years to write verses, and in 1824 published at Stockholm her first novel, "The Neighbors," which was soon translated into German, French, Dutch, and Russian, and in 1842 into English

by Mary Howitt, who also translated her subsequent works. Previous to 1849 she had published "The Home," "The Diary," "The H—— Family," "The President's Daughter," "Nina," "Brothers and Sisters," "Life in Dalecarlia," and "The Midnight Sun." In 1849 she visited the United States, where she was cordially received. She spent two years in travelling through the country, and made a short visit to Cuba. Her observations were recorded in a work entitled "The Homes of the New World," which was published simultaneously in Sweden, England, and the United States in 1853, and was exceedingly complimentary to this country and to her American friends. On her return to Europe she spent some time in England, and published at Altona in 1852 an account of her visit under the title of "England in 1851." From England she returned to Sweden, where she wrote two more novels of home life, "Hertha" (1856) and "Father and Daughter" (1858). In 1857 she went to the south of Europe, and the result of her travels was published in 1860 under the title of "Two Years in Switzerland and Italy." From Italy she went to Palestine, Greece, and Turkey, and in 1863 published her observations on those countries. A German edition of her works in 30 volumes was completed in 1864.

BREMERHAFEN, or *Bremerhaven*, a town of Germany, belonging to Bremen, of which it is the port, situated on the estuary of the Weser, at the mouth of the river Geeste, 30 m. N. N. W. of Bremen, with which it is connected by railway and the Weser; pop. in 1871, 10,594. The channel of the Weser having become so filled up as to be impassable for large vessels, the spot on which Bremerhafen stands was acquired from the kingdom of Hanover in 1827, and the town was established in 1830. The port, which is accessible for the largest vessels, consists of an outer harbor, a sluiced dock, and an inner harbor. Bremerhafen has become the chief point from which German emigrants sail for America. (See **BREMEN**.) For their accommodation the *Aumandererhaus* was erected in 1849 by the authorities of Bremen, capable of sheltering 2,500 persons at a time, and of feeding 6,000 a day. The town is defended by Fort Wilhelm on the opposite bank of the river. Lines of steamers connect it with London, Hull, and New York.

BRENDAN, or *Brandanus*, an Irish saint, died in 578. He founded religious establishments in Ireland and England, and is the legendary hero of voyages undertaken under the protection of an angel, narratives of which, in Latin and old French, were published in Paris in 1836, from original MSS. of the 11th or 12th century. Blommaert's *Oudolaemschen Gedichten* (Ghent, 1838-'41) gave a version of another MS. said to have existed in old German. A Low-German dramatic version and German translation of the Latin appeared at the end of the 15th century.

BRENDEL, Franz, a German writer on music, born at Stolberg, Nov. 26, 1811, died in Leipzig, Nov. 25, 1868. He was successively the editor of the *Neue Zeitschrift für Musik* and teacher at the conservatory of Leipzig, and published *Die Musik der Gegenwart* (1854), *Geschichte der Musik in Deutschland, Italien und Frankreich* (4th ed., 2 vols., 1868), and other works. He was a follower of Wagner.

BRENNER, a mountain of Austria, in Tyrol, between the Inn, the Aicha, and the Adige, 6,788 ft. high. The railway from Innsbruck to Botzen, thence to Trent and Verona, crosses the Brenner pass at the height of 4,775 ft. It was constructed by the Austrian government at a cost of \$140,000 a mile, and completed in 1867. There are 28 tunnels on the road, one of which is 2,800 and another 2,200 ft. long.

BRENNUS. I. The leader of the Senonian Gauls, who defeated the Romans at the Allia, and took Rome, about 890 B. C. Having quit- ted the city upon receiving a ransom for the capitol, he returned home with his gold. A popular legend, however, relates that a Roman army under Camillus appeared at the moment the gold was being weighed, defeating and slaying Brennus and his followers. II. Another warrior of the same name was a leader of the Gauls who made an irruption into Macedonia and Greece, 279 B. C. Having defeated in the following year Ptolemy Ceraunus, and after- ward Sosthenes, the chief who succeeded the Macedonian king, he crossed the pass of Ther- mopylae, and invaded the heart of Greece, but was repulsed in an attack on Delphi with great loss, and subsequently died by his own hand.— By modern historians Brennus is thought to have been, not a proper name, but merely a Gallic title signifying king, chief, or general.

BRENTA (anc. *Medoacus Major*), a river of northern Italy, rises in a small lake about 8 m. S. E. of Trent in Tyrol, flows E. by N. and then E. by S. to a point about 20 m. from its source, where it crosses the boundary of Italy, turns S. near Primolano, and follows a southern course as far as Bassano. Here it emerges from the deep mountain gorges through which it has thus far flowed, and passes S. and S. E. across the level country of the province of Venice. At Limena, and at a point about 6 m. E. of Padua, canals connect it with the Bacchiglione; and at Dolo, 9 m. E. of Padua, another canal runs S. and S. E. from the Brenta to Brondolo at the southern end of the Venetian lagoon. This last-named channel was cut to break the force of the current at the principal mouth of the river; for the Brenta, continuing its course, flows into the lagoon exactly opposite the city of Venice. But this was found insufficient, and a second canal parallel to the first was cut from La Mira, a few miles further east. The main bed of the Brenta below La Mira was at the same time made into a canal with embank- ments and locks; this part of the river is called Brenta Morta, and forms the principal means for the transportation of freight between Venice

and Padua. The whole length of the river is about 120 m.

BRENTANO, Clemens, a German poet and novelist, born at Frankfort-on-the-Main, Sept. 9, 1777, died at Aschaffenburg, July 28, 1842. He studied at the university of Jena, and after- ward taught there as a *Privatdocent*. While here he married in 1804 Sophie Mereau, the divorced wife of a professor, a woman who shared many of the fantastic theories he had already begun to advance, and had written poems and romances of some merit. She died little more than a year after the marriage, in consequence of which he fell into a singular misanthropy. After making his home suc- cessively at Frankfort, Heidelberg, Vienna, and Berlin, he withdrew entirely from the world in 1818, retiring to the village of Dülmen near Münster. In the last years of his life, however, he again visited the larger towns, living in Rat- isbon, Munich, Frankfort, and Aschaffenburg. His works, the first of which were published under the pseudonyme of Maria, were wild and fantastic. His original and audacious vagaries, together with the peculiarities of his sister Bet- tina von Arnim, his wife, and others connected with him, made the family name almost prover- bial, and "mad as a Brentano" was a not un- common phrase among German wits. Clemens Brentano's principal works are: *Satyren und poetische Spiele* (Leipzig, 1800); *Godwi, oder das steinerne Bild der Mutter* (2 vols., Frank- fort, 1801); *Die lustigen Musikanten* (a mu- sical drama, Frankfort, 1803); *Ponce de Leon* (Göttingen, 1804); *Der Goldfaden* (Heidelberg, 1809); *Die Philister vor, in und nach der Geschichte* (Berlin, 1811); *Die Gründung Prags* (Pesth, 1815); *Victoria und ihre Ge- schwister* (Berlin, 1817); *Schneeglöckchen* (Ham- burg, 1819); *Geschichte vom braven Kaspar und dem schönen Annerl* (2d ed., Berlin, 1851). Brentano also aided his brother-in-law Achim von Arnim in the preparation of the *Knaben- wunderhorn*.

BRENTFORD, a market town of England, and nominal capital of the county of Middlesex, 7 m. W. S. W. of London; pop. in 1871, 20,279. It is situated on the Thames, is connected by a bridge with Kew, and stands on the line of the Great Western railway. Here are the water works of the West London company, with a chimney 150 ft. high. Near by is Sion house, the seat of the duke of Northumberland, and Osterley park, of the countess of Jersey. Al- though usually considered the county town, the magisterial business of the county is transacted at Clerkenwell. It has some trade, which is facilitated by the Grand Junction canal, con- necting with the Brent river. The town takes its name from the ford, crossed at an early pe- riod by a bridge, in aid of which Edward I. in 1280 granted a toll for three years. In 1016 Edmund Ironsides, after driving the Danes from London, totally defeated them at Brent- ford; and here in 1642 Prince Rupert defeated the parliamentarians under Col. Holles.

BRENTON, Edward Pelham, captain in the British navy, born July 18, 1774, died April 6, 1839. He was on active service during the wars with France, 1793-1815. He wrote a life of the first Earl St. Vincent, and a "Naval History of Great Britain from 1783 to 1822." He founded the "Children's Friend Society."

BRESCHET, Gilbert, a French physician, born at Clermont-Ferrand, July 7, 1784, died in Paris, May 10, 1845. He was professor of anatomy in the school of medicine at Paris, attending surgeon to the Hôtel Dieu, and member of the academy of sciences. He wrote much upon various anatomical, physiological, and surgical subjects; his most valuable work is that upon the spinal veins, published in 1819 and enriched with carefully executed plates.

BRESCIA. I. A province of Italy, in Lombardy, bounded N. by Bergamo and Tyrol, E. by Verona and Mantua, S. by Cremona, W. by

Lodi and Bergamo; area, 1,784 sq. m.; pop. in 1871, 450,750. The province is mountainous or hilly in the north, and level in the south. It is watered by the Oglio, and its affluents the Mella and Chiese. It embraces Lake Iseo and borders on Lake Garda. The soil is highly fertile. One of the most important branches of industry is the production and manufacture of silk; wool of superior quality is also produced. There are manufactures of woollen and cotton goods, metals, and porcelain. Brescia has long been famous for its iron and steel manufactures, especially of weapons and firearms, whence it was called in former times *l'Armata*. Wheat, maize, hay, butter, cheese, flax, wine, oil, and chestnuts are important productions. The trade of the province is principally carried on in the capital. Among the principal towns are Lonato, Montechiaro, and Salò. II. A city (anc. *Brizia*), capital of the province, 50 m. E.



Brescia.

by N. of Milan; pop. in 1871, 38,906. It stands on the rivers Mella and Garza, at the foot of a hill. The strong castle on the top of the hill was in former times called the falcon of Lombardy. It is a well built town, noted for its numerous fountains. It is connected by railway with Verona and other Italian cities, and by the railway through the Brenner pass of the Alps with Austria and the rest of Europe. The ancient cathedral and the other churches contain many paintings of the great Italian masters. The new cathedral, or *duomo nuovo*, was begun in 1604, but the vaulting of the cupola was only completed in 1825. The chief ornament of the church of Santa Afra is "The Woman taken in Adultery," by Titian. Among the public buildings is the palazzo della Loggia in the piazza Vecchia, intended for the town hall, the beautiful façade of which suffered much

from bombardment in 1849. The palazzo Tosi contains, among many famous pictures, the "Saviour," by Raphael. The picture galleries in the palazzi Averoldi, Fenaroli, Lecchi, Martenigo, and in other palaces, are noted for their artistic attractions. A whole street, the corso del Teatro, has the fronts of the second stories decorated with Scriptural, mythological, and historical paintings. The Quirini library, founded in the middle of the 18th century by Cardinal Quirini, contains nearly 100,000 volumes, besides a vast collection of manuscripts and objects of antiquity. The most unique monument of Brescia is the cemetery (*campo santo*), the finest in Italy, built in 1810. Brescia is the seat of the provincial government, of a bishopric, and of a tribunal of commerce. There are various charitable institutions, a theological seminary, gymnasia, a lyceum, a botanical gar-

den, cabinets of antiquities and natural history, an agricultural society, several academies (the philharmonic being one of the oldest in Italy), a casino, a fine theatre, and a large structure outside of the town for the annual fair. A Roman temple of marble was excavated in the vicinity in 1822.—The town was originally inhabited by the Cenomani, and under the Romans became a flourishing colony of Transpadane Gaul. It was pillaged by Attila, and eventually passed into the hands of the Lombards. Otho the Great raised it to the rank of a free imperial city. It joined the Lombard league against Frederick Barbarossa, was besieged by Frederick II., was for a long time distracted by the contests between the Guelphs and the Ghibellines, and many times changed masters. In 1426 it was taken by Carmagnola; in 1438 besieged by Piccinino; in 1509 it surrendered to the French; in 1512 it rose against the conquerors, but was recaptured and sacked by Gaston de Foix. Occupied soon after by Venice, it remained in possession of that republic till its downfall in 1797. During the Napoleonic era it was the capital of the department of Mella, and in 1814 was made over to Austria. In 1849 the Brescians rose against Austria; the town was bombarded, March 30, by Haynau, and held out until noon of April 2, when it was compelled to surrender, and to pay a ransom of \$1,200,000. After the war of 1859 the city and province were incorporated with the kingdom of Italy.

BRESLAU (Polish, *Wroclaw*), a city of Prussia, capital of an administrative district of the same

name in Silesia, at the junction of the Ohlau with the Oder, 180 m. S. E. of Berlin; pop. in 1871, 208,025, of whom about 58 per cent. are Protestants, 33 per cent. Roman Catholics, and 7 per cent. Jews. The Oder is navigable from Breslau for large boats. It is the second city in size and importance in Prussia. Its revenue in 1871 amounted to 30,251,651 thalers. It is connected by railway with Cracow, Warsaw, and Vienna, with Berlin and Leipsic, with Posen and Stettin, and with Schweidnitz and the rich manufacturing and mining districts of the Riesengebirge. It is an important emporium, has many mercantile establishments and large annual fairs, and is the most considerable wool market in the world. All the agricultural, manufacturing, and mineral produce of Upper and Middle Silesia comes to its market. Cotton, linen, and woollen goods, metals, coal, spirits, glass, paper, grain, and dyestuffs are among the principal articles of trade. In the city itself there are manufactories of dyed goods, and of leather, needles, liquors, refined sugar, tobacco, oil, cotton, linen, fine iron, gold and silver ware, broadcloths, laces, earthenware, straw hats, beer, vinegar, &c. The town is well built, and has a circumference of 11 m. It has many remarkable buildings, among which are St. Elizabeth's church, begun about 1250, with a tower 354 ft. high, and a celebrated organ, the church of Mary Magdalen, with two towers, the Reformed church, the Catholic cathedral, with many monuments of the 13th century, the *Sandkirche*, the church of St. Dorothea, and St. Michael's church, recently built by the prince

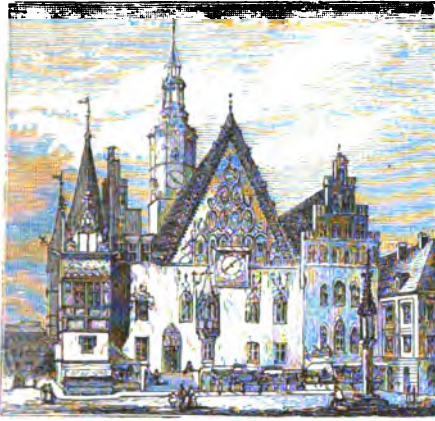


Breslau.

bishop; the council house, the university building, the royal palace, the new hall of the diet, the Jesuits' college, now belonging to the

university, the residence of the prince bishop, the palace of Count Henkel, and the central railway depot. The city theatre was burned

in 1865, but soon rebuilt. In the market place is a statue of Frederick the Great, and one of Blücher in the Blücher place. The streets are well paved and broad, with granite sidewalks,



Town Hall.

and lighted with gas. The benevolent institutions are more numerous and better provided than in most cities of Germany. There are four gymnasia, a seminary for classical and one for popular teachers, an architectural and artistic academy, and a university founded in 1702 and enlarged in 1811, which possesses a library of upward of 800,000 volumes and many manuscripts, a botanical garden, an observatory, a clinical institute, and various scientific collections. There is a missionary and a Bible institution, and the Leopold's or imperial society of naturalists has its seat here. A zoological garden was opened in 1865. There are four large libraries besides that of the university, several small but valuable picture galleries, a numismatic cabinet, 18 hospitals, and four orphan asylums.—Breslau is built on originally Polish territory; it was founded about 1000. When in 1163 the surrounding territory was separated from Poland by the emperor Frederick I., who intervened in a quarrel of the sons of Ladislas II., and made two of them, Konrad and Boleslas, independent dukes of what is now Silesia, a city charter was given to Breslau, which was already inhabited by a large population of Germans. In 1335 it came into the possession of the Bohemian kings, and in 1526, with Bohemia, into that of the Austrians, from whom Frederick the Great wrested it by the invasion of 1741 and the seven years' war. Like all Silesia, it shared the good and bad fortune of Bohemia in the 14th, 15th, and 16th centuries, and succumbed in two attempts of the citizens to make themselves independent of the archbishops and the patrician families. It early embraced the reformation. In 1742 the first peace between Frederick the Great and Austria was concluded here. In 1757 the Austrians defeated near the city a weaker Prussian army, but were driven out again in the same year by

Frederick's victory at Leuthen. In 1760 Tauenzien bravely defended the town against Loudon's besieging army. In 1806-'7 it was beleaguered by the French under Vandamme, taken, and the fortifications demolished.

BRESSANI, Francesco Giuseppe, an Italian missionary, member of the society of Jesus, born in Rome in 1612, died in Florence, Sept. 9, 1672. He was sent to Canada, and spent two years among the Indians near Quebec. In the spring of 1644 he was directed to go on a mission to the Hurons. On the way he was captured by a party of Iroquois, who subjected him to fearful torture. They then made him over to an old squaw, to take the place of a deceased relative; she sent him to the Dutch of Fort Orange, now Albany, who paid a large ransom for him, kept him until his strength was restored, and then put him on board a vessel bound for La Rochelle, where he arrived on Nov. 15. In the following spring, maimed and disfigured, he returned to Canada, and was again sent to the Hurons, with whom he remained till 1650, when, his health being broken down, he returned to Italy. His *Relazione dei missionarj della compagnia de Gesu nella Nuova-Francia* (Macerata, 1658) was translated into English in Montreal in 1852.

BRESSANT, Jean Baptiste Prosper, a French actor, born at Châlon-sur-Saône, Oct. 24, 1815. He made his début in Paris in 1835, and after acting for long terms at the Variétés and Gymnase theatres of that city and in St. Petersburg, he became in 1854 a member of the Comédie Française. He has been distinguished as a light comedian both in the modern and the classic drama; also in such parts as Richelieu in *Dumas's Mlle. de Belle-Isle*.

BRESSON, Charles, count de, a French diplomatist, born in Paris, died by his own hand in Naples, Nov. 2, 1847. His father was one of the chief clerks in the department of foreign affairs. During the restoration he was sent on a special mission to the republic of Colombia. After the revolution of 1830 he entered the service of Louis Philippe, and was appointed chargé d'affaires and afterward minister in Berlin. In 1834 he was made minister of foreign affairs, and afterward sent again to Berlin as ambassador. During this embassy, in 1837, he negotiated the marriage of the duke of Orleans with the princess Helen of Mecklenburg, and was created a peer. In 1841 he was made ambassador to Madrid, where he brought about the marriage of the duke of Montpensier with the sister of Isabella II., and of the queen herself with her first cousin, the infante Francisco de Assis. For this service Bresson expected to be rewarded by the embassy to London, but failed to obtain it, and was sent in 1847 as ambassador to Naples. The king of the Two Sicilies, whose hope of securing the hand of a Spanish princess for one of his brothers had been frustrated by Bresson's negotiations, received him in the most offensive manner; and the affront, preying upon a mind

already smarting under humiliation, led him to commit suicide.

BREST, a fortified town of France, in Brittany, department of Finistère, on a bay of the Atlantic, 310 m. W. of Paris; pop. in 1866, 79,847. It is the chief station of the French marine, and one of the first military and naval ports in Europe. It stands on the N. side of a landlocked haven, accessible only by the Goulet, a narrow fortified entrance about a mile wide, divided in the middle by a rocky island. The town is built on the summit and sides of a projecting ridge, some of the streets being so steep that they can be traversed only on foot. A deep narrow creek runs up from the harbor behind this ridge, separating the town on its left bank from the suburb of Recouvrance on its right, communication being kept up by an iron bridge 65 ft. above high-water mark, with a swing opening to allow ships of war to pass. Just

above the mouth of the creek, which is defended by several tiers of batteries, is an old castle. This creek, which forms the inner port, is so narrow that there is barely space for the merchant vessels, and for 30 or 40 ships of war moored side by side. Above the castle the shores on both sides are enclosed by a high wall, separating the dockyard from the town. Around the harbor run long quays at which the largest vessels can lie, and five artificial basins are excavated out of the rock. There is also a commercial harbor, with a breakwater, extending far into the roadstead. The dockyard is situated on both sides of a narrow creek winding between steep rocks, which have been pared down so as to afford space for the buildings, quays, and yards. Three large dry docks have been cut out of the solid rock. On one side of the creek are the magazine, sail loft, rope yard, and hospital; on the other the foundry and



Brest—Swing Bridge.

sailors' barracks. Slips for building vessels occupy the level space at the water's edge; and above these are the steam-engine factory, from which machinery is lowered into the vessels. On the Recouvrance side of the harbor are the forges, furnaces, and workshops necessary for the construction and repair of steam engines. The galleys or hulks for convicts no longer exist, the prisoners confined in them having been removed in 1860 to the penal colony of Cayenne. Outside the dockyard is the marine hospital, admirably arranged, containing 26 wards, each having 58 beds, attended by a large body of *religieuses* called *sœurs fidèles de la sagesse*, who are lodged within the building. The roadstead of Brest lies between the promontory of Finistère on the N. and the peninsula of Quélern on the S., which have a space of only 1,749 yards between them, and this is still further contract-

ed by a rock in the centre, which compels vessels to pass directly under the batteries on each side. The roads, consisting of several bays, are about 15 m. long, and in some places 3 m. broad; and although there are many shoals and sand banks, several hundred vessels can anchor there. The harbor is so fortified as to be apparently impregnable against any naval attack. Fully 400 heavy guns can be brought to bear from the batteries outside the Goulet, while 60 more sweep the anchorage within. Besides these the fortifications of the town itself mount more than 400 cannon, and behind is an intrenched camp defended by heavy guns. Brest has a considerable trade in wheat, oats, wine, brandy, beer, sardines, mackerel, and water-proof goods. It is connected with America by a submarine cable, terminating near Duxbury, Mass. It has a city hall, chamber of commerce, observatory,

naval school, cabinet of natural history, botanical garden, communal college, public library, and marine library, with 27,000 volumes.—Brest was of some importance during the middle ages. The old castle belonging to the dukes of Brittany fell into the possession of the English, and sustained a long siege by the French under Duguesclin and Olisson. In 1395 it was surrendered by Richard II. in consideration of 12,000 crowns. It was made a fortified port by Richelieu in 1631, and the fortifications were modernized by Vauban in 1680–88. In 1694 a combined English and Dutch fleet appeared in the roadstead and disembarked a strong force, hoping to take the fortifications by surprise; but a storm dispersed the fleet, and most of the land force were killed. In 1757 an English fleet of 19 vessels approached the mouth of the Goulet, and 20,000 men were landed, but made no attack. Since that time Brest has never been seriously threatened by an enemy; but it was blockaded in 1794 by Admiral Howe, who won a great naval victory in its neighborhood (June 1).

BREST LITOVSKI (Pol. *Brześć Litewski*), a fortified town of Russia, in the government and 110 m. S. of Grodno, on the right bank of the river Bug; pop. in 1867, 22,793, of whom one half were Jews. It was formerly the capital of a Lithuanian palatinate, and contains an old castle, a Jewish high school, and a military school, and has a considerable transit trade. In 1794 Suvaroff here gained a victory over the Poles.

BRETAGNE. See BRITTANY.

BRETHREN, Bohemian. See BOHEMIAN BRETHRENS.

BRETHREN, Plymouth. See PLYMOUTH BRETHRENS.

BRETHREN, White, a sect of the 15th century, who first appeared in the Italian Alps about 1399, and were headed by a priest, probably a Spaniard, although some say that he was a Provençal, others that he was a Scotchman. He claimed to be the prophet Elias. He and his followers were arrayed in white, and carried large crucifixes from which a bloody sweat appeared to exude. He affirmed that it was his mission to announce the speedy destruction of the world by an earthquake. He commenced his ministrations in Lombardy, and thence extended them to the Ligurian Alps. His success was at first great. He entered Genoa at the head of 5,000 followers, and the excitement spread to Lucca, Pisa, and Florence. Their leader prescribed and practised mortification and rigorous penances, and endeavored to effect a renewal of the crusades. But Pope Boniface IX. caused him to be apprehended and burnt at the stake, whereupon his followers dispersed, and the sect became extinct, having existed only a few months.

BRETHREN AND CLERKS OF THE COMMON LIFE (*Fratres et Clerici Vita Communis*), a religious order established in the Netherlands near the close of the 14th century, by Gerhard de Groot. It was divided into two classes, the

lettered and the illiterate. The first class was mainly composed of the clergy, who gave themselves to study and copying books, while the second class engaged in manual labor. They adopted the rule of St. Augustine, and gave up their property to the common use. Their vows were not considered binding for life. They were sanctioned by the council of Constance, and Luther and Melancthon speak favorably of them. The flourishing period of the order was from 1400 to 1500, most of their houses being built between 1425 and 1451; they had in all from 80 to 50 establishments. By the middle of the 17th century the order became extinct, some of the brethren becoming Protestants, while some were absorbed by the Jesuits and other Roman Catholic orders. This order is frequently confounded with the Beguins and Lollards.

BRETHREN AND SISTERS OF THE FREE SPIRIT, or Spiritualists. See BEGHAARDS.

BRETHREN OF THE CHRISTIAN SCHOOLS, an order established at Rheims by the abbé de La Salle in 1679, and sanctioned by Benedict XIII. in 1725, six years after the death of the founder. The object of the order was to provide instruction for the poorer classes. The members take upon themselves the vows of chastity, poverty, and obedience. These vows are first taken for three years only, and then renewed for life by those who desire to remain in the order. Their costume is a coarse black cassock, and a small collar or band around the neck, for the house, and a hooded cloak and a wide hat for outdoor purposes. Their diet is of the simplest kind. Their teaching is mainly rudimentary, although in some of their schools Latin and the higher mathematics form part of the course. Priests may be admitted to the order, but no member may become a priest, and lest they should aspire to that dignity, the brethren are forbidden to study Latin until reaching the age of 80. In 1688 the order was introduced into Paris. In 1792 they refused to take the oath to the civil constitution, and were driven from their houses and debarred the exercise of their functions. At the peace of 1801 they returned to their schools, and soon spread themselves again over France, whence they extended into Italy, Corsica, Cayenne, Belgium, and Algiers. In 1880, in the revolution of July, the persecution which fell upon the Jesuits also visited them. The aid of government was withdrawn. At that epoch they opened evening schools for adults, wherein they received and taught mechanics and laborers who had no time to devote to learning in the day. The chief house of the congregation is at Paris, rue Oudinot, and has generally from 400 to 500 brethren. In 1868 the congregation had upward of 10,000 brethren, and instructed in France alone more than 800,000 pupils. In the United States in the same year 323 brethren instructed about 15,000 pupils. Besides the Brethren of the Christian Schools founded by La Salle, there are a number of other

Roman Catholic congregations devoted to the cause of education. (See SCHOOL BROTHERS AND SISTERS, CONGREGATIONS OF.)

BRETHREN OF THE HOLY TRINITY, a society founded in France near the close of the 12th century, whose members pledged themselves to give a third part of their revenues to procuring the redemption of Christians who had fallen captive to the infidels, and were in Mohammedan slavery. It was established by John of Matha and Félix de Valois.

BRETON, Jules Adolphe, a French painter, born at Courrières. He excels in pictures of rural life and scenery. He began to exhibit about 1855, and in 1859 and 1861 received medals of the first class for landscapes. Among his best works are "The Gleaners," "Blessing the Grain," "Evening," "The Weeders," and "The Turkey Keeper."

BRETON LANGUAGE AND LITERATURE. See CELTIC LANGUAGES AND LITERATURE.

BRETON DE LOS HERREROS, Manuel, a Spanish poet, born at Quel, Old Castile, Dec. 19, 1800. He was a volunteer in the army, and held civil offices at various times, but owing to his liberal politics he was not permanently employed. His comedy, *A la vejez viruelas*, composed in 1817, was successfully performed in 1824; and he became the author of upward of 150 plays, original or remodelled from old Spanish comedies, or taken from the French and Italian. His recent dramas have been modelled after the early dramatic school of Spain. Several of his plays were performed in Paris in 1847, and one of them was translated into French under the title of *Le poil de la prairie*. He excels also as a humorous and satirical poet. A collection of his poems was published in 1850-'52 (5 vols., Madrid). He is a member of the royal academy of Madrid.

BRETSCHNEIDER, Karl Gottlieb, a German theologian, born at Gersdorf, Feb. 11, 1776, died in Gotha, Jan. 22, 1848. He became general superintendent at Gotha in 1816, and was appointed superior councillor of the consistory in 1840. His religious works are very numerous. Among the most important are: *Systematische Entwicklung aller in der Dogmatik vorkommenden Begriffe* (1805; 4th ed., 1841), and *Handbuch der Dogmatik der evangelisch-lutherischen Kirche* (1814-'18; 4th ed., 1838). He commenced, under the title of *Corpus Reformatorum*, a collection of the writings of the German reformers, which was continued after his death by Bindseil (28 vols., 1834-'60). He also wrote religious novels: *Heinrich und Antonio* (1826), *Der Freiherr von Sandau* (1829), and *Clementine* (1841). His autobiography was published in 1852.

BREUGHEL. I. Pieter, the first of a celebrated family of Dutch and Flemish painters, born near Breda about 1520, died in Brussels about 1580. He studied with Peter Koeck, travelled through portions of France, Italy, and Switzerland, making sketches, and went to reside at Antwerp, where he was made a member of the

academy in 1551. He painted village festivals, attacks of banditti in wild landscapes, or scenes among the gypsies. **II. Pieter the younger**, son of the preceding, called "Hell Breughel," from the diabolical character of his subjects, born about 1567, died in 1625. His pictures generally represent scenes in which devils, witches, sorcerers, or robbers play a conspicuous part. One of his most famous works is the "Temptation of St. Anthony." **III. Jan**, brother of the preceding, commonly known as "Velvet Breughel," either from his habit of dressing his figures in velvet, or from the softness and delicacy with which he painted flowers, born at Brussels about 1570, died about 1635. His first pictures were miniatures and fruit and flower pieces; but after a tour through Italy he took to painting landscapes, which are remarkable for exquisite finish, and the spirit and character of the minute figures introduced into them. He returned to Flanders with so great a reputation as a landscape painter, that artists frequently applied to him to paint backgrounds and other accessories to their pictures. In this way he assisted Rubens in the celebrated pictures of "Adam and Eve in Paradise," "The Four Elements," and "Vertumnus and Pomona."

BREVARD, a S. E. county of Florida, bounded E. by the Atlantic ocean; area, about 5,600 sq. m.; pop. in 1870, 1,216, of whom 19 were colored. The surface is low and flat and dotted with lakes. The Kissimee river intersects the W. part, and empties into Lake Okeechobee, on its S. W. border. Low sand islands lie along the coast, between which and the mainland is a narrow sound called Indian river. The chief productions in 1870 were 38,650 bushels of Indian corn, 4,000 of peas and beans, 38,700 of sweet potatoes, and 6,450 lbs. of rice. There were 191 horses, 149 mules and asses, 69,390 cattle, and 4,550 swine.

BREVARY, a book containing the "canonical hours" or "divine office" which the Roman Catholic clergy and monastics are obliged to recite every day, and which was formerly said by the laity likewise. The name, derived from the Latin *breviarium*, *brevi*s, is supposed to have been given because the office now in use is an abridgment of one much longer. The origin of the breviary was different in different parts of the church. Thus the diocese of Antioch is said to have received it from Diodorus or Flavian, that of Constantinople from St. John Chrysostom, and that of Milan from St. Ambrose. Rome obtained it probably from Pope Gelasius I., in 494, and the churches of Spain from St. Leander, bishop of Seville about 620. These office books differed greatly both from one another and from the Roman breviary of the present day. In the course of time they became filled with legends of the saints of very doubtful authenticity, and many reforms were attempted, but without much success until Pope Pius V. and the council of Trent established a uniform office for the whole

church. This was subsequently corrected by Clement VIII. and Urban VIII., and is the one now in use. Before the council of Trent, however, Cardinal Quignon had published in France an expurgated and amended breviary, which, though condemned by the Parisian faculty of theology, was approved by Julius III. and Paul IV., passed through several editions, and for many years was generally used by the French clergy. In the Greek church, the office book is called *τάξις* (order), *ὑπολόγιον* (dial), or *εὐχολόγιον* (collection of prayers). It is very nearly the same in all the monasteries and churches, and is divided into two parts, one containing the morning, the other the evening office. The psalter is in 20 divisions, called *καθίσματα* (sittings), because a rest or pause is made after each one. The Armenians and other nations have similar breviaries.

BREWING, the manufacture of beer. The process consists in producing a saccharine extract from barley or other grain, adding to this hops for flavoring and preserving, and causing it to undergo the vinous fermentation. Water, composing as it does about 88 parts in 100 of beer, is an important ingredient, and great attention should be paid to its selection. The freer it is from all decaying and impure matters the better, not only as far as the quality of the product is concerned, but also its quantity, for the elimination of the impurities has been found to involve a loss. There is a difference of opinion as to whether hard or soft water is better for brewing. The celebrated English ales, Allsop's, Bass's, and Salt and co.'s, are made with very hard water containing large quantities of earthy sulphates. The brewers of Bavarian beer, however, prefer either soft water, or that which contains less mineral matter. Although grains and other substances are used in making beer, barley has been found to be the most suitable, being the most easily managed, and furnishing the best beer. There are two species of the grain in this country, *hordeum vulgare* and *hordeum distichum*, the former having four and the latter two rows of seeds in the head. Besides these there is a third species, cultivated in Europe, called *hordeum hexastichum* or six-rowed barley, known in Scotland by the name of bigg, a hardy plant, well adapted to cultivation in that country. The two-rowed yields the larger and heavier grain. The common four-rowed barley of this country is preferred by the maltsters of the United States and Canada. It has a thinner husk, contains a larger proportion of starch, and is said to make the best wort. The hop, the female catkin of *humulus lupulus*, gives the principal flavor, and also aids in clarifying the liquor by the removal of albuminous matter. The various parts of the catkin are the scales, nuts, and lupuline grains, the last being of most importance, but the other parts are all valuable. As the lupuline grains contain about two per cent. of volatile oil, it is important to have the hops well pressed at the

time of gathering. They should have a uniform golden yellow color, and when rubbed in the hands should make a yellow stain and yield a strong odor.—The art of brewing may be divided into—1, malting; 2, preparing the wort; 3, fermenting; 4, clarifying. Malting consists of three distinct stages: 1, steeping; 2, couching, sweating, and flooring; 3, kiln-drying. In making malt great attention must be given to the temperature of the air. It cannot be carried on in hot weather, so that the work of the maltster is confined to the autumn, winter, and spring months. The steeping, which has for its object the expanding of the grain with water to prepare it for germination, is performed in large cisterns of wood, stone, or cement. Water of ordinary temperature is turned in to a certain height, and as much barley is introduced as, when levelled, will allow the water to cover it to a depth of six inches. The steeping generally lasts from 50 to 65 hours. Too long a time is injurious, interfering with the germination and causing waste. The process is completed when the grain may be easily pierced with a needle or easily bent. Some maltsters carry the process further than others, and prefer to have the grain soft enough to be mashed between the fingers. If it is continued too long, so that the contents have become milky, the barley is spoiled for malting; it has lost the capacity to germinate. Barley imbibes about 50 per cent. of its weight of water in the process of steeping, and increases in bulk about 20 per cent. It is well to wash it several times while steeping with fresh water. This causes no waste, prevents souring, and therefore promotes the uniform germination of the seed. After the steeping has been carried to the proper point, the water has to be drawn off and the barley placed upon the couching floor, which is usually constructed of stone or cement. The temperature of the room should be between 50° and 55° F., to allow the maltster to have the best control of the process. Still, the process can be conducted with fair results until it reaches 60°. When it rises above that temperature malting should be discontinued. When taken from the steep the malt is placed upon the floor in beds about 18 inches high, and far enough apart to allow of the necessary spreading afterward, and there allowed to lie for 12 hours, when it is turned over, but without being spread. In 12 hours after this, or 24 after removal from the steep, the grain has attained its greatest bulk. The kernels are no longer wet on the surface, and to the touch feel almost dry. The couch, however, soon begins to grow warm, and gradually increases in temperature, until at about the end of the second day it has reached 60° or 65° F. It gives off an agreeable fruity odor resembling that of apples, and a dew appears upon the surface of the grain. This is the sweating stage, during which the germination commences. The fibrils of the radicle sprout from the tips of the ker-

nela, and a white elevation is formed which separates into three or more radicles. About 24 hours after this, generally toward the end of the third day, the plumula, called the acrospire, appears at the same point, and turns back under the husk, toward the other end of the seed, and would there issue as a green leaf if its growth were not arrested. Consequently the couch is spread out till it is not more than eight or ten inches deep. The temperature, however, continues to rise until the end of the fourth day, varying somewhat, according to circumstances, until it has reached 80° F. This is thought by the best maltsters in this country to be the limit to which it should be allowed to go; and they keep the grain at this temperature until the sprouting has proceeded almost far enough. Then the beds are spread still further, with great care. This is a critical time, and requires much judgment on the part of the maltster. The acrospire has now very nearly reached the other end of the seed, and the transformation of the starch has been carried as far as desirable. The barley, or malt, as it may now be termed, is carefully turned over two or three times a day, being spread more at each turning, until at the end of the process the depth is only three or four inches. This constitutes the flooring, as it is technically termed; but the couching, sweating, and flooring are only different stages of the same process. The temperature at the last spreading is said to be in England about 62° F., and in Scotland, five or six degrees lower. In this country careful maltsters keep the temperature near 70° till very near the close, alleging that by not too suddenly checking the growth of the sprout they secure more uniform development. The couching and flooring occupy about two weeks in England, and in Scotland a somewhat longer time. In this country the grain is usually kept on the floor about nine days in the most favorable weather, and in the spring and fall sometimes only seven or eight days. It is the object of some maltsters to convert as much of the starch as possible into sugar, while others rely upon accomplishing this in the kiln, and in the succeeding operations of the brewer. While the acrospire has been growing a wonderful transformation has been going on within the seed. The contents have become whiter, and crumble between the thumb and finger like meal. The albumen has disappeared and the gluten has diminished in quantity. About half of the starch remains unchanged, but the other half has been converted into dextrine and grape sugar. If the germination continued, the roots and stem would appropriate these substances in their growth. The unchanged starch is not lost, but is converted into sugar in succeeding processes. How has this transformation been accomplished? At the commencement of germination, in malting, as well as when a seed is placed in the earth, a substance is formed at the base of the sprout by a change which has taken place in the albu-

men in consequence of the influence of the vitalizing principle in the germ, which has been awakened under the influence of heat and moisture. This substance is called diastase, and possesses the power at ordinary temperatures of converting starch into dextrine and grape sugar. This transformation can also be effected by gluten, but it requires a longer time. In malting, if the germination is allowed to proceed until the rootlets and stem attain a certain size, it will be found on examination that all the starch, sugar, and gluten have disappeared: the starch having passed into the soluble condition of sugar, and, together with the gluten, having been appropriated by the growing stem and fibrils. The object of the maltster in causing germination is, through the action of diastase, to convert the starch of the grain into dextrine and grape sugar, which is the natural sugar of vinous fermentation. When the greatest amount of dextrine and sugar has been produced, with the least loss in the growth of the rootlets and plumula (acrospire), the operation is arrested by subjecting the malt to the heat and dry air of the kiln. The malt kiln is a chamber having a floor made of sheet iron, perforated with numerous holes sufficiently small to prevent the grain from falling through. This floor is heated by an ascending current of hot air, by means of a furnace below, which not only warms the iron floor, but passes up through the malt, warming and drying it at the same time. The malt should be spread upon the floor about five or six inches deep and raised to a temperature of 80° F., the heat gradually increasing until at the end of the operation it has reached 180° or sometimes 140°. The malt is to be turned over about every three hours, until toward the close, when the heat increasing, it should be turned every hour, to secure even drying and even color. Kiln-drying usually takes two days, including the time occupied in placing the malt in the kiln and removing it. It is then taken to another apartment and spread out, or it may be put in heaps and further manipulated and improved in color. When it is desired to make beer of a deep color, the heat of the kiln is increased. For the brewing of porter, a portion of the malt is almost charred, or the whole of it may be made of a deeper color. When taken from the kiln the grain has lost about 20 per cent. of its weight before steeping; but as the raw grain would have lost by the same degree of drying 12 per cent., the loss occasioned by malting is only about 8 per cent. The kiln not only dries the grain and prevents the further growth of the rootlets and acrospire, and thereby the loss of sugar, but also serves to convert a considerable portion of the unchanged starch into dextrine. Good malt is plump, sweet to the taste, has a pleasant odor, breaks easily between the teeth, and is full of soft flour. Barley of one grade and age only should be used at one steeping, as new barley germinates more quickly than old. After kiln-drying, the

radicles, which have become brittle and have fallen off, are separated by a wire sieve.—The preparation of the wort is the next process in the art of brewing. Ordinarily the brewer commences here, because he generally buys his malt of the maltster. The process consists of three different stages: 1, mashing, or the extraction of the saccharine material from the malt; 2, boiling the wort and adding the hops; 3, cooling. The mashing is performed in a vessel called the mash tun, which is a large tub from six to eight feet in height and from twelve to fifteen feet in diameter, and capable of containing from 100 to 300 barrels. It is made of wood and bound with iron hoops, like an ordinary tub, which it resembles, except that it is usually larger at the bottom than at the top. It is furnished with machinery for stirring the mash, and has a double bottom, the upper one, which is from five to ten inches above the lower, being perforated with small holes to allow the wort to pass through. Mashing has for its object the conversion of the unchanged starch left in the malt into dextrine and grape sugar, and the extraction of it, together with the dextrine and sugar already formed in the malting, and also of the gluten which remains, by means of water at a suitable temperature; thus forming a solution which is called unhopped wort. An important agent in effecting this is the diastase which was produced during germination, and which still remains in the malt. To appreciate the nature of the operation, it is necessary to be acquainted with the following facts: The dextrine, or starch gum, which is the first product of the action of malt upon starch, may be preserved in that state, or still further changed into grape sugar, according to the temperature at which the mixture is digested. If we take eight or ten parts of malt and stir it in about 400 parts of water at 80° F., then raise it to 140° and stir in about 100 parts of starch, and then further increase the temperature to 158°, and maintain it between that and 167° for about half an hour, the milky, pasty solution becomes fluid and transparent. The starch is converted into dextrine, and if the solution is now raised to the boiling point and evaporated, the dextrine will be obtained in the form of a viscid gum, which is used in the arts under the names of starch gum and British gum, although it is prepared by another process. The raising the temperature of the solution to the boiling point has deprived the diastase of its peculiar property of transforming dextrine into sugar. If, however, the temperature had been kept between 158° and 167° for two or three hours, the dextrine would have been converted into sugar by the continuance of the saccharine fermentation, of which the transformation of starch into dextrine is a part. This is what takes place during the process of mashing, and explains why it is performed at a certain temperature, and why great care ought to be taken that the water is not too hot when turned upon the malt.

Mashing is usually performed in the following manner: Water, at a temperature of 160° to 165° F., is introduced into the tun beneath the false bottom, while at the same time malt which has been crushed between iron rollers is poured in at the top. The proportion of malt and water used in the preparation of wort for beer of ordinary strength, is about one quarter of malt (352 lbs.) to 220 gallons of water, or in the proportion of 1 to 5 by weight. This will yield a wort having a specific gravity of about 1.06, and containing about 14.66 parts of malt extract in 100 parts of liquid. Strong beers, like Burton and India ales, are made from a heavier wort, while schenkbier, or draught lager, and other light kinds are made from lighter worts. At the commencement of the mash all the malt is run into the tun at once; if it were not, there would be a difference in time at which different portions would be acted upon, and there would be in other respects interferences with the proper conduct of the process. The water is not all let in at one time. At first enough is added to the malt to allow of thorough mixing by the revolving paddles, or agitators, which move around in the tun. After standing fifteen or twenty minutes more water at the same temperature, or perhaps two or three degrees higher, according to the judgment of the brewer, is turned in, using altogether for the first setting a little less than one half of the whole quantity to be used in the brewing. The mash is again thoroughly stirred and allowed to stand about two and a half hours. Those brewers who do not care to have the starch mostly converted into dextrine and grape sugar during the first setting do not let the mash stand quite so long; but it is generally considered better to have the transformation well advanced during the first setting. The wort, as the liquid extract is called, is now drawn off into an underback (lower vessel), from which it is afterward pumped into the boiler. The underback is frequently dispensed with in modern breweries, and the wort is drawn immediately from the mash tun into the steam boiler which is now preferred to the old copper boiler, with a fire under it. When the wort is run into the boiler it receives its proper allowance of hops. This prevents the occurrence of changes which might interfere with the fermentation, and prevent the beer from attaining its finest quality. The wort, when drawn off, should be transparent and about the color of the malt from which it is extracted. Turbidity indicates that it contains unaltered starch, which would cause the beer to become sour. This danger furnishes an argument in favor of allowing full time for the first setting. A little more than half of the water which remains to be added is now introduced at a temperature of 167° into the tun, stirred with the remaining malt, and allowed to stand from half an hour to fifty minutes. It is then drawn off into the underback, or directly into the steam boiler as

the case may be, and the requisite quantity of hops is added. The remainder of the water is then run into the mash tun at the same, or perhaps a little higher temperature, and the mash stirred and allowed to stand about half an hour. The wort, which has little strength, is then drawn off, and when introduced into the boiler the remainder of the hops is turned in also. The boiling, which has been going on for an hour or more, is continued two and a half or three hours longer. The quantity of hops that should be added varies with the kind of beer which is brewed. In making stock ale, from five to eight pounds, but for the lighter ales and for lager and schenkier, from two to three pounds to the barrel are used. The addition of hops to the wort is an operation about which there is a variety of opinions. Some suppose that the hop is merely added to flavor the beer, but it possesses quite as much value in preserving the beer as it does in flavoring it. The tannin contained in the scales aids in clarifying the wort, by combining with the albuminous matter that may have remained undecomposed. The other principles also, as the lupuline and the odorant oil, exert an influence during the cooling process in checking premature fermentation; and during fermentation the hop moderates the action in such a way as greatly to improve the quality of the beer. A perfectly satisfactory explanation of the manner in which the hop acts has not yet been given, nor has any substitute for it ever been found. The continued boiling of the hop being regarded as necessarily involving a great waste of the odorant principle, it has been attempted to extract its virtues and add them to the wort after it has been boiled; but thus far success has not attended the experiment. The flavor of the beer is good, and if it has been very carefully brewed from the best materials perhaps it has been improved, but its keeping qualities are inferior. Perhaps the addition of a little tannin to the wort during boiling might remedy the defect, but it is questionable, as the hop has other preserving qualities besides the tannin. It is found, moreover, that although in boiling hopped wort a strong odor is perceived, the loss is not as great as is often supposed. It has also been attempted to extract the virtues of the hop in the wort without bringing it to the boiling point, but this experiment has also been unsuccessful. Although the beer had a fine appearance and flavor, it would not keep as well as that made from boiled worts. In fact, the most practical brewers have found it necessary thus far to boil their worts, to arrive at satisfactory results. It is probable that the easily decomposed azotized matters cannot be with certainty eliminated in any other way without injury to the beer. The boiling is known to have continued long enough if the coagulated flocks are distinctly separated from the perfectly clear liquid in which they are suspended; or if they are found collected together in considerable

quantity at the bottom of the boiler. When the boiling is finished, the hopped wort is drawn off into another tun, called a hop back (hop vessel), which has a perforated false bottom, or strainer, for the purpose of retaining the hops. From the hop back the wort is pumped up into the coolers, which are placed in the upper story of the brewery. These coolers are wide, shallow pans, six or eight inches in depth and fifty or more feet square; they cause rapid cooling in consequence of the great amount of surface exposed to the cooler atmosphere and the great evaporation which takes place. In this country, however, this form of cooler is only used for cooling the wort of lagerbier; an apparatus called a refrigerator being used to cool the wort of ale or strong beer. This is not fermented at so low a temperature as lagerbier is, and the necessary cooling can be performed with much greater facility by means of the refrigerator, which is simply a coil or layer of pipe through which a stream of cold water may be made to pass with any required rapidity. A form of hydrometer called a saccharometer is used to measure the degree of concentration of the worts while they are passing through the various stages of preparation. When the wort reaches the cooler or the refrigerator it usually has a temperature of about 200° or more, according to the rapidity with which it has been pumped. It is desirable to have it cool as quickly as possible, so that no premature fermentation may take place before the yeast is added in the fermenting tun. Wort which is to be subjected to the ordinary top or rapid fermentation should be brought to a temperature of 60° or 63°. As soon as it is run into the fermenting tun, yeast is added to induce the vinous fermentation. The quantity used depends upon the extent to which it is desired to carry the fermentation, and also upon the amount of saccharine matter in the wort. For the fermentation of Bavarian beer much less is used, and that of a different kind, than for the ordinary English ale. For the stronger kind about one gallon of yeast is used in fermenting 100 gallons of wort, but for lighter ales one part to 150 or 200 is sufficient. The yeast is taken from the last preceding fermentation, and should have been produced from similar beer. It is generally prepared a short time before using by mixing it with a portion of wort and putting it in a warm place till it begins to ferment. This mixture, which is called lobb, is then stirred into the wort. Too much yeast will cause excessive action, consume too much of the sugar, and make the process more unmanageable. The principal constituents of the wort, or gyle (as it is termed by the English brewers after reaching the fermenting tun), are grape sugar, dextrine which has not yet passed into sugar, gluten, lupuline (the bitter principle of the hop), and other odorant principles. The brewer's problem now is, to produce in this infusion, from the elements it contains, a certain quantity of alcohol

and carbonic acid, and to bring the liquor to a palatable condition, and one in which it may be preserved for use. The yeast is added to convert the dextrine into grape sugar, and this into alcohol. No part of the process of brewing requires such careful attention as the fermentation. A certain degree of imperfection in the wort may be remedied to a large extent by skilful fermentation; but an error in the latter process cannot be corrected. In a space of time varying from six to twelve hours, depending upon the condition of the yeast and the temperature of the wort and of the surrounding air, the fermentation commences, and a foam rises in little hillocks to the surface. This foam, which is composed of yeast, gluten, and sugar, made into fine bubbles by carbonic acid gas, appears in this form because the bubbles of acid ascend in separate columns, which are maintained by the motion which has been established in the liquid. The foam becomes thicker toward the middle of the tun, where it is thickest and rises to the height of two feet or more. After a time the color of the top changes to a light brown, probably the result of oxidation. The fermentation is generally better when this appearance is slight. The disengagement of gas is in proportion to the quantity of sugar converted into alcohol, and the temperature rises correspondingly, or would rise if it were not repressed by passing cold water through a coil of pipe placed in the tun; this is called the attemperor, and may be used for either lowering or raising the temperature. After a time, varying from 24 to 36 hours, the head of yeasty froth falls, and the newly formed yeast becomes more viscid, and the fermentation much less active. If it were allowed to proceed without the removal of this yeast, much of it would be precipitated, and, continuing to act upon the remaining sugar, would in time convert all of it into alcohol, and finally into acetic acid. It is therefore removed by skimming, and in the best breweries the liquid, or gyle, is drawn off into a second fermenting tub, or stillion, as it is sometimes called, and the fermentation allowed to proceed there until the process is completed. Here perfect yeast, formed from the gluten still remaining in the wort, rises to the surface, as a tough, partially organized scum, which is used in the fermentation of the succeeding brewing. The process for strong stock ale is continued for six or eight days, but for lighter ales, such as are called "present use," the time occupied is only four or five days. During the fermentation, from the diminution of the quantity of sugar and the production of alcohol, the fluid becomes thinner, and its specific gravity less; hence the fermenting process is also called by brewers the attenuation. The temperature rises during the fermentation, so that it may reach 80° or more; but the more careful brewers, except for special reasons, repress it, and endeavor to keep it below 70°. In Scotland the fermentation is often conducted at a temperature below 60°,

and the process prolonged considerably, occupying from ten days to a fortnight. In some breweries an apparatus is attached to the second fermenting tubs, or stillions, by which the yeast is carried off as fast as it forms. In others, however, it is allowed to remain floating upon the surface of the beer until the latter is drawn off. When the fermentation has perfectly converted the gyle into beer, it is drawn off into casks, for storage or for sale. This is sometimes done by running it into a third tun, called a racking tub, from which, after standing a short time, it is drawn off into the casks. These are then immediately bunged up and kept at a temperature of from 60° to 64°. The lighter ales may be drawn for use in three or four days after casking, but the stock ales are stored for six or more months. The temperature at which wort is fermented produces not only a difference in the products, but also in the mode in which the process is carried on. The conversion of sugar into alcohol and carbonic acid proceeds very slowly at a temperature as low as 45°; but the conversion of soluble gluten into insoluble ferment, when acted upon by a like ferment in the presence of air at such a temperature, is effected with facility.—The problem solved in the fermentation of Bavarian beer is the elimination of the gluten and other azotized matters that may be present, without the conversion of all the sugar into alcohol and carbonic acid, or the conversion of alcohol into acetic acid, and leaving the beer in a condition in which the sugar and alcohol are not liable to further change from exposure to the air. This is effected by a peculiar kind of fermentation, in which the yeast does not form upon the surface of the wort, but falls to the bottom, where it undergoes but little further change, thus leaving the surface of the liquid freely exposed to the air, by the action of which the soluble gluten becomes oxidized and transformed into insoluble yeast. The reason that ordinary yeast remains upon the surface of the wort is that it is held there by bubbles of carbonic acid, which is generated in great quantity in rapid fermentation. The yeast of slow fermentation falls to the bottom because the carbonic acid, disengaged from the slowly decomposing sugar, ascends in bubbles too minute to give sufficient buoyancy. The reduction of temperature allows the oxidation of the gluten to proceed more rapidly than the conversion of the sugar into alcohol and carbonic acid, so that before all the sugar is consumed the gluten is eliminated and has fallen to the bottom, where it possesses but little power, especially at the low temperature at which the wort is kept. This low temperature also prevents the alcohol from passing into acetic acid. If, after all the gluten is thus rendered insoluble and deposited at the bottom of the vessel, the beer is drawn off, it no longer contains any substance which is capable of being converted by oxidation into a ferment, and therefore possesses the quality of keeping a long time without becoming sour.

In the ordinary process of fermentation, in which the yeast rises to and remains at the surface, the gluten is not all rendered insoluble, but some of it remains in the beer, and on exposure to the air absorbs oxygen, and produces a ferment by which the remaining sugar is transformed into alcohol and carbonic acid, and the alcohol, again, into vinegar. The fermentation of Bavarian beer occupies a much longer time than that of common ale. The latter, as we have seen, occupies only six or eight days, while the other requires from four to six weeks, or even longer. The wort, which is prepared very much in the same manner as for other beers, is pumped from the hop back into the shallow coolers in the upper story of the brewery, and is reduced, either in them or by afterward passing it over the refrigerator, to about 45° F., as speedily as possible. It then passes into the fermenting tuns, which are placed in cool rooms or cellars having a temperature of 40° to 45°. The yeast is stirred into the wort, and in the course of two or three days the fermentation commences with the appearance of very minute bubbles of carbonic acid gas, which ascend and carry some of the yeast and the gluten to the surface, but do not retain it there; for the gluten absorbs oxygen from the air, and the insoluble ferment which it forms is deposited at the bottom of the tun as a viscous sediment, leaving the surface of the liquid exposed to the action of the air. The gluten is thus converted into yeast by atmospheric oxidation, and in time is entirely removed without the decomposition of all the sugar. Only as much has been transformed into alcohol and carbonic acid as it is desirable to have the beer contain. This kind of fermentation is called *Untergährung*, or bottom fermentation, and the yeast, which differs from common yeast, is called *Unterhefe*, or bottom yeast. Ordinary fermentation, in which the yeast forms upon the surface of the wort, is called *Obergährung*, or top fermentation, and the yeast thus formed, *Oberhefe*, or top yeast, and, according to Liebig, is in a state of putrefaction, while bottom yeast is in a state of eremacausis, or decay. The precipitated yeast has not the capacity of exciting ordinary fermentation, but ordinary yeast may be employed in exciting slow fermentation at a low temperature, which causes a yeast to be deposited at the bottom which, by being used a few times, may be converted into the yeast of bottom fermentation. After the beer has been fermented sufficiently it is drawn off into large casks and allowed to lie for several months in cellars or cool rooms, which are kept at a temperature of between 40° and 45° F. A very slight fermentation and fining process here continues, until at last the beer is perfectly transparent and free from all fermentable matter. On account of this treatment it is called *Lagerbier*. Many of the modern lagerbier breweries now use enormous quantities of ice to cool the rooms in which the beer is fermented and stored. These rooms may be so constructed that the temper-

ature can be perfectly controlled; and as the air retains no more moisture than it does in a cellar, it being generally near the dew point in either case, the ice-cooled rooms are liked by those who use them, particularly as the brewing can be conveniently carried on during the summer months. Manufactured grape sugar is now used by many of the lagerbier brewers to furnish an excess of material for the production of alcohol, thus allowing a smaller percentage of gluten in the wort. As the gluten in the Bavarian process is the chief substance to be eliminated, this practice allows the fermentation to be completed in a shorter time than when malt only is used. When the grape sugar contains no acid or other objectionable matters, the practice results in economy, but only on account of the saving of time, as the price of the manufactured sugar is fully equal to the cost of producing it in the wort from malt.—*Adulterations.* A few years ago ale drinkers were alarmed by a report that strychnine was used in the manufacture of ale. Dr. Ure gives the following reasons for considering this report groundless: "1. Strychnine is an exceedingly costly article. 2. It has a most unpleasant metallic bitter taste. 3. It is a notorious poison, and its use in any brewery would ruin the reputation of the brewer. 4. It cannot be introduced into an ordinary beer brewed with hops, because it is entirely precipitated by infusions of that wholesome, fragrant herb. In fact, the quercitannic acid of hops is incompatible with strychnia and all its kindred alkaloids. Hence, hopped beer becomes in this respect a sanitary beverage, refusing to take up a particle of strychnia, and other noxious drugs of a like character." Mr. Herepath has given a test for the detection of picrotoxine, the active principle of the *cocculus Indicus*, which is based upon the property possessed by charcoal of separating it from its aqueous solution. An excess of acetate of lead is added to the beer to throw down the lupuline and other extractive matters, the excess of lead in the filtrate removed by sulphuretted hydrogen, and the excess of this gas removed by boiling. The solution is then evaporated to a sirup, and agitated with animal charcoal, which will absorb any picrotoxine that may be present. On cooling, the charcoal is collected on a filter, washed with a small quantity of water, and dried at 212° F. The charcoal is then boiled in pure alcohol, which being filtered will upon evaporation yield crystals of picrotoxine if the beer was adulterated with it. If the evaporation is slowly and carefully conducted, the picrotoxine will separate in well defined quadrilateral prisms, sometimes in needles, and, when the evaporation has been rapid, in beautiful plumose tufts. Picrotoxine is inodorous, intensely bitter, and neutral to vegetable colors; dissolves in 150 parts of cold, in 25 parts of boiling water, and in 8 parts of boiling alcohol of specific gravity 0.800. Picric acid, which is said to be used in the adulteration of beer, may

be detected by Rohl's test, which is exceedingly delicate, and consists in boiling unbleached sheep's wool in the suspected beer for eight or ten minutes, and then washing the wool. If picric acid is present to the amount of only one part in 125,000, the wool will have a decided canary color. Chalk is sometimes used to neutralize the acid of sour beer. It may be detected by finding more than the usual quantity of lime in the ash. Carbonate of soda is often added to summer beer in kegs, particularly to that which has not been sufficiently fermented, and is liable to become sour. Common salt is frequently used, and can be quite readily detected by the taste, and by the thirst it creates.

BREWSTER, Sir David, a Scottish physicist, born at Jedburgh, Dec. 11, 1781, died at Allerly, near Melrose, Feb. 10, 1868. He was educated at the university of Edinburgh, where his attention was early turned to natural science. In 1807 he received the degree of LL. D. from the university of Aberdeen for his acquirements in this department; and in the following year he projected "The Edinburgh Cyclopædia," of which he continued to be the editor until its completion in 1830. In the mean time he continued those special researches into the composition and influence of light which made him famous. For his papers for the royal society of London upon the polarization of light he received several medals, and in 1816 one of the prizes of the French institute for the two most important discoveries in physical science made during the two preceding years. In 1819, in conjunction with Prof. Jameson, he commenced the "Edinburgh Philosophical Journal," which he afterward conducted alone for 16 years under the title of the "Edinburgh Journal of Science." He was also for many years one of the editors of the "London, Edinburgh, and Dublin Philosophical Journal." From 1827 to 1833 he was engaged in investigating the best means of illuminating lighthouses. In 1830 he received the principal medal of the royal society of London for further discoveries in the polarization of light, and was knighted in the following year. He was chosen principal of St. Leonard's college, Aberdeen, in 1841, and in 1857 he was president of the British association for the advancement of science, of which he was one of the founders. In 1859 he was chosen one of the eight foreign associates of the institute of France, and principal and vice chancellor of the university of Edinburgh. For many years he contributed brilliant articles on scientific subjects to the "North British Review" and the "Popular Science Magazine." He made many improvements in the construction of the microscope and telescope, invented the kaleidoscope, brought the stereoscope into scientific and artistic use, introduced the Bude light, and demonstrated the utility of dioptric lenses and zones in lighthouse illumination. Sir David Brewster did more than any other man of his day to popularize the study of natural science. Besides his numerous contribu-

tions to periodicals and cyclopædias, and to the transactions of learned societies, he wrote "Treatise on Burning Instruments" (1812); "Life and Letters of Euler" (1823); "New System of Illumination for Lighthouses" (1827); "Treatise on Optics," "Letters on Natural Magic," and "Life of Sir Isaac Newton" (1831); "Martyrs of Science" (1841); "More Worlds than One" (1854); and "Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton" (1855).

BREWSTER, William, an elder of the Plymouth pilgrims, born at Scrooby, England, in 1560, died at Plymouth, Mass., April 16, 1644. He was educated at Cambridge, and entered the service of William Davison, ambassador in Holland, but presently retired to the north of England, where his attention was chiefly occupied by the interests of religion. He was one of the company who with Mr. Bradford attempted to escape to Holland, and were thrown into prison at Boston. Having obtained his liberty, he first assisted the poor of the society in their embarkation, and then followed them to Holland. Here he opened a school at Leyden for instruction in English, and also set up a printing press. He was chosen a ruling elder in the church at Leyden, and accompanied the emigrants to New England in 1620, where until 1629 the principal care of the church devolved upon him, though, as he was not an ordained minister, he could never be persuaded to administer the sacraments.

BREZNÓ BANYA. See BRESA.

BRIALMONT, Henri Alexis, a Belgian military writer, born at Venloo, May 25, 1821. He is the son of Gen. Laurent Mathieu Brialmont, ex-minister of war. In 1843 he left the military academy at Brussels with the rank of sub-lieutenant. He was employed as engineer in fortifying Diest and Antwerp. In 1847 he became connected with the ministry of war, attaining in 1861 the rank of major. His principal work is the *Considérations politiques et militaires sur la Belgique* (3 vols., Brussels, 1851-'2). His *Histoire du duc de Wellington* (3 vols., 1856-'7) is also a work of some importance.

BRIAN BORU, or *Borelme* ("Brian of the tributes"), the most celebrated of native Irish kings, born about 927, slain at Clontarf on Good Friday, 1014. He was the son of Kennedy, king of Munster, and succeeded him in 978. His first exploits were against the Danes of Limerick and Waterford. He confined them within the limits of those cities, and made them pay tribute in pipes of wine. In 1002 he made himself *ard-riagh*, or supreme monarch of Ireland, putting aside the legitimate families, the O'Neills and O'Melaghlin, and imposing upon the subordinate kings heavy tributes in cattle, hogs, iron, mantles, and wine. His palace was at Kincora, in county Clare, near the present town of Killaloe. He had also palaces at Tara and Cashel. He caused a road to be constructed round the coast of the whole kingdom. In the latter

part of his reign Maelmora, the king of Leinster, revolted and called in the Danes to his assistance. Brian Boru repulsed the allied Danes and Leinstermen at Clontarf, and died on the battlefield. His son Morrogh also fell in the same fight. The Danes never regained any independent position in Ireland after this defeat. An ordinance of his prescribed that every one should adopt as a surname the name of his father, and thenceforth surnames became permanent in Irish families.

BRIANÇON (anc. *Brigantium*), a fortified town of France, in Dauphiny, department of Hautes-Alpes, 35 m. N. E. of Gap; pop. in 1866, 3,579. It is at the junction of the two sources of the river Durance, and at the foot of Mont Genève, and is 4,285 ft. above the sea. It commands the principal pass to the Italian and Swiss frontiers, is a depot of military stores for the French Alps, and is surrounded with a triple line of ramparts. Seven forts whose cross-fires protect all the approaches to the town are connected with each other by subterranean passages cut in solid rock. The principal works



are on the left bank of the Clarée, which is crossed by a bridge of a single arch, 127 ft. in span and 179 ft. above the surface of the water. The position is considered impregnable. The most famous productions of Briançon are chalk and manna (the latter from larch trees, also called Venice turpentine); and scythes, sickles, nails, cutlery, copper ware, and hosiery are manufactured there. It was formerly capital of a district called Briançonnais, which during the early part of the middle ages was almost independent, then successively annexed to Dauphiny and the crown of France, and at the beginning of the 18th century for some years in the possession of Savoy.

BRIANSK, a town of Russia, in the government and 70 m. W. N. W. of the city of Orel, on the right bank of the Desna; pop. in 1867, 13,881. The town has an imperial cannon foundry, arms manufactory, and arsenal, a convent and many churches, and carries on a brisk trade in grain, hemp, and linen.

BRIAREUS, a renowned giant of Greek mythology, said by Homer to have been called Briareus by the gods, but by men Ægeon. He was

the son of Coelus and Terra, and brother of Gyges and Cottus, and had like them 100 arms and 50 heads. When the inferior deities conspired against Jupiter and endeavored to dethrone him, Briareus rendered effective aid to the father of the gods; but when Briareus himself rebelled, he was put in durance under Ætna, which belched forth fire and flame as often as the monster struggled in his dungeon.

BRIBERY, at common law, the offering or acceptance of any undue reward to or by any person whose office or ordinary employment relates to the administration of public justice, in order to influence his conduct in such office or employment, and incline him to act otherwise than as a strict and conscientious discharge of duty would require. It extends to the giving or receiving a reward to influence the action of a voter at parliamentary elections, or of a member of parliament, or a cabinet minister or member of the privy council, of a justice of the peace, or officer summoning jurors, or the jurors themselves; and the attempt, though not successful, is a misdemeanor. Formerly very loose notions prevailed in England regarding the acceptance of gifts by judges from the suitors before them; and Lord Chancellor Bacon could make no better apology for the receipt of a great number of such gifts by himself than that the practice was common. The severe punishment inflicted upon him put an end to the practice for a long time; but in the reigns of Charles II. and James II. there was a shameful venality of judges, which, however, terminated at the revolution of 1688, since which the integrity of the English bench has generally been above reproach. The conspicuous exception was that of Lord Chancellor Macclesfield, who was impeached and removed from office in 1725 for making sale of offices in his patronage, and conniving at an illegal use of moneys on deposit in his court. In 1865, also, Lord Chancellor Westbury found it necessary to resign because not able to defend his conduct in the bestowment of patronage. Bribery is also punishable in England under various statutes. By statute 11 Henry IV., all judges and officers of the king convicted of bribery are subject to forfeiture of treble the amount of the bribe, are punishable at the king's will, and to be discharged from his service for ever. The provisions against bribery at parliamentary and other elections are very minute and specific, but no law has yet been able to remedy what is now and has for a long time been a crying evil. It perhaps reached its climax in the time of Sir Robert Walpole, but the enormous sums of money now expended in the parliamentary contests are not consistent with purity in elections. By common parliamentary law bribery of or by a member is sufficient cause for expulsion.—The statutes of the United States prescribe punishments for the bribery of members of congress and other officers of government, and of jurors, and bribery in contracts. Bribery of a member of a legisla-

tive body, or an attempt to bribe a member, or a judge or juror, is also a contempt of the body or the court, and has sometimes been punished as such. In 1870 a member of congress was expelled for a corrupt distribution of his patronage, and another resigned on similar charges being made against him. The charge of corruption has seldom been made against judges of the highest courts in this country, and their integrity has generally been above suspicion. In the state of New York, however, charges of a very gross nature were made against two judges of the supreme court, which resulted in 1871-'2 in the resignation of one and the impeachment and condemnation of the other; a judge of the superior court in the city of New York was also tried by the senate and dismissed from office. The several states have statutes for the punishment of different classes of bribery, and the punishments range from a fine to imprisonment in the penitentiary.—For an account of parliamentary corruption in England, see May's "Constitutional History," chapter vi., and the numerous authorities there referred to.

BRICK, a building material made of clay, moulded commonly in rectangular blocks, and baked. The most ancient records make mention of their use. The early inhabitants of Babylonia found on the plain in the land of Shinar the clay for their construction, and "said one to another, Go to, let us make brick, and burn them thoroughly; and they had brick for stone, and slime had they for mortar." (Gen. xi. 3.) The slime was probably the semi-fluid bitumen used at early periods in Egypt and Babylonia as a cement; and no better building materials have ever since been used than those ancient bricks, and the natural mortar employed to bind them together. The walls of Babylon were built of burnt bricks laid in bitumen, as were the exterior walls of the still existing mounds, the largest of which is supposed to have been the tower of Babel. The interior of this mound is filled with unburnt bricks set in clay, with layers of reeds between every five or six courses. In other parts of the work the bricks were laid in lime mortar of exceeding toughness. From the frequent reference to the making of brick in the Old Testament, the manufacture appears to have been an important one with the Israelites and Egyptians. It was a principal task imposed by the latter upon their captives. The gathering of straw and stubble for mixing with the clay indicates that they were sun-dried, like those seen at this day in some of the pyramids of Egypt. Upon one of these, probably the brick pyramid of Howara, 10 leagues from Cairo, was formerly an inscription, cited by Herodotus, of which the following is a translation: "Do not undervalue me by comparing me with pyramids of stone. For I am better than they, as Jove exceeds the other deities. I am made of bricks from clay, brought up from the bottom of the lake adhering to poles." The same ma-

terial was used for other structures of high antiquity. The Greeks gave particular attention to having them perfectly adapted to the use to which they were to be applied; in some instances, as stated by Pliny, not allowing them to be used until after they had been seasoned five years, and had received the approval of a magistrate. The palaces of Croesus, king of Lydia, of Mausolus of Halicarnassus, and of many other Asiatic sovereigns, some of the temples of Athens, and the walls of that city looking toward Mount Hymettus, were built of this material. The Romans perfectly understood the art, as the bricks in the baths of Titus and Oaracalla bear witness. The stone of the Colosseum has not proved so durable. In the ruins of their forts, walls, &c., in Great Britain, they are found of an excellent quality, of a deep red color, well burnt, and very hard. The brick made by their successors in England was not particularly noteworthy until about the middle of the 14th century. In the time of Henry VIII. and Queen Elizabeth so good an article was produced, that it was employed in the construction of many fine edifices. In modern times the manufacture is more remarkable for the immense scale upon which it is conducted, than for the good quality of the product—a fact attributed by English writers to the practice so generally adopted in London of building houses upon lands leased for a certain period, at the expiration of which the property reverts to the owner of the ground. The Dutch appear to have succeeded better than the English to the skill of the Romans. Their bricks have been famous from an early period for soundness and durability. So substantial were they, that they served well for the floors of houses, and even for street pavements. Specimens of Holland brick, brought over by the early settlers, are to be met with in some of the old Dutch houses of New York. Among the Asiatic nations the manufacture has continued at a high degree of excellence from the remotest periods. In the hilly country of Nepal bricks are made of such remarkably compact texture, and so elegantly ornamented upon their surface, as to be peculiarly fitted for architectural decorations. The Chinese give to the face of their brick the texture of porcelain. The ancient Peruvians excelled in the manufacture of brick, as in many other of the useful arts. Ulloa, after carefully examining the large bricks, was confident there must have been some secret in their composition, which was lost in his time, so superior were they to those made by any process then known. They are described by Prescott as large blocks or squares, made of a tenacious earth mixed up with reeds or tough grass.—The plastic nature of clay, and its property of hardening by heat into a substance like stone, are qualities so obviously adapting it for building purposes, that no people requiring permanent dwellings have failed to perceive them, and availed themselves of its use. But clay is not uniform in compo-

sition, and much of it requires some admixture of other substances. The purer aluminous earths consist of about two parts of silica to one of alumina, together with a larger or smaller proportion of water. They are remarkable for their plasticity, and mix freely with any quantity of water. But such materials, if moulded and baked, would shrink greatly and bend and warp; cracks would be produced from the outside hardening before the moisture of the interior could escape through the viscid mass. Such rich or fat clays require to be tempered with sand, or cinders and ashes, which render their texture more open, so that they retain their form; but they may without this tempering serve for baking into thin sheets as tiles. The quantity of sand or other substance required for any clay can only be determined by actual experiment. Some clays contain a proper proportion of sand naturally mixed with them. Others contain too much, and the bricks from these will fall to pieces. Admixture of fatter clays is the only method of making such useful, unless an expensive process be adopted of suspending the earth in water, and drawing off and collecting that which is held longest in suspension. Besides sandy clay or loam, calcareous clay or marl is sometimes used for the manufacture of brick; but if much lime be present, the compound may be too fusible to answer the purpose of making good brick. Oxide of iron is rarely absent. In the process of burning it is converted into the peroxide, and imparts to the whole brick its red color, more or less deep according to the degree of oxidation. The first of the following analyses is of a clay highly charged with oxide of iron, given in Knapp's "Chemical Technology;" it is largely used in the neighborhood of Glasgow, Scotland, for making brick; the quantity of water is less than is commonly given in the analyses of clay; the second is of a clay suitable for potters' use or the manufacture of brick:

	(1)	(2)
Silica.....	49.44	48.5
Alumina.....	34.26	33.2
Protoxide of iron.....	7.74	1.0
Lime.....	1.48	8.5
Water.....	1.94	18.0
Magnesia.....	5.14	Loss, 0.8
	100.00	100.00

The more free the clay is from other ingredients than silica and alumina, the better the bricks made from it withstand high temperatures. Clay taken freshly from its bed, even if of suitable composition, is not in a condition to be at once moulded into brick. It must first be exposed to the weather until its particles are disintegrated, when it can be kneaded into a mass of uniform consistency. This is best effected by the action of frost, the water diffused through the substance expanding by freezing and breaking it in every direction. The longer the exposure is continued, the more effectually is the clay reduced. This is followed by covering the clay with water and leaving it for

a short time in a pit or tank. The kneading was formerly conducted by treading of horses, oxen, or men, and the work was no doubt more efficiently done by the naked feet of men than by the machinery afterward introduced for this purpose; for the lumps, stones, sticks, &c., mixed with the clay were thus readily detected and removed. The pug-mill is the first form of machinery introduced for grinding the clay. It is a conical or cylindrical tub, standing on end, with a shaft passing vertically through it, armed with blades, which cut and knead the clay delivered in the top, forcing it down by their oblique position to the line of the shaft, as this is carried round by a horse attached to a horizontal arm. The clay thus ground and kneaded continually passes through an opening in the bottom of the mill, and is then cut into convenient pieces and stacked away for use. It must then be handled again for moulding it, and the practice was formerly to forcibly throw a quantity into the mould, which was a box of wood or of brass without top or bottom, and then strike off what was superfluous. The mould is always sanded to prevent the clay adhering to it. A box containing a row of five or seven moulds open at bottom was afterward contrived to run in under the lower part of the pug-mill and receive the clay, the further exit of which was at the same time arrested until another box of moulds replaced the one just removed. The work was thus rendered more expeditious with less expenditure of labor. In whatever way the kneading is conducted, especial care is taken to separate from the clay roots, sticks, and pebbles, the presence of which in the bricks would disfigure and weaken them. Even if the stones were buried in the interior of the bricks, a cavity would be left around them, for the reason that the stones first expand while the clay contracts by heating, and afterward contract by cooling in a much greater degree than the clay. In tempering the clay, it was found highly advantageous at the great brick yards near London to introduce a portion of coal ashes, which always contain more or less fine coal. The use of fine anthracite was introduced for the same purpose at the kilns on the Hudson river in 1888, and has been found so serviceable that it has been ever since continued. The quantity employed is about 75 bushels to 100,000 bricks. It is thoroughly intermixed in the kneading, and has the effect of saving a portion of the fuel, while it diminishes the time of burning; the quality of the bricks, however, is not so good as of those made in the old way. For drying the bricks previous to baking, the first requisite is a smooth level yard fully exposed to the rays of the sun, or, if covered by a roof, open to a free circulation of air all around. To this the moulds containing the bricks are brought, and, being placed upon the ground, are cautiously lifted off, leaving the bricks behind. They are arranged in rows, and in case of rain, if not under a roof, must be

covered with boards, as they are in danger of being washed away. The drying should be thorough, or the bricks will be likely to crack in baking. After depositing the bricks on the drying floor, the moulds are taken back, are dipped in water, and then into sand, and are ready to be refilled. When well dried the bricks are removed to be baked. This is effected in England sometimes in permanent kilns, which hold as many as 20,000 bricks, and are filled and emptied like those for baking earthen ware, the burning being completed in about 48 hours. The method in common use in this country of piling the green bricks upon one another to make their own kiln is also adopted there; but the arrangement is called a clamp instead of a kiln. By this method half a million bricks, or even a million, are burned in one operation. A central double wall is built lengthwise along the kiln, its lower portion of bricks already baked, and on each side are parallel longitudinal fire flues built of unburnt brick, laid very open; over them the great body of brick is piled after an exact system, vertical flues ascending to the top, and the whole work being laid in an open manner for the free circulation of the gases. The fires are made in one end of the flues, and the heat is increased by the combustion of the small coal which was scattered throughout the heap as it was built up. The top and sides of these clamps are usually built of bricks that have been already once baked. The underbaked bricks of previous firings may thus be conveniently finished. Over the whole a covering of loam is sometimes laid to prevent the fire from burning too rapidly; and screens of wood or other material are used to protect portions against the wind. The time required to burn a kiln varies with its extent and the manner in which it is fired. The English accounts state: "So very slow is the progress that bricks in the neighborhood of London take about three months in the burning." The time formerly required on the Hudson river for burning the great clamps of from 300,000 to 1,000,000 bricks was about two weeks, and the consumption of oak wood was about 40 cords to 100,000 bricks. The quantity usually regarded as sufficient is, however, 83½ cords. After the introduction of anthracite dust in the clay, the time of burning was reduced to three or four days, and the consumption of fuel to 16 cords to 100,000 bricks. The mere expenses of burning this number of bricks are rated at \$80 for 16 cords of wood, \$3 for 75 bushels of anthracite dust, and \$6 for 4 days' attendance; total, \$89. The preparation of the clay, moulding, drying, building up of the kiln, waste, &c., make all together a larger amount than the burning. As the bricks in a clamp are exposed to great differences of temperature, they are found of various qualities when the process of burning is completed. Those near the flues are partially vitrified and melted together. Many are slightly fused on the surface, and baked to a stony hard-

ness. These are called clinker bricks, and are used in situations where they will be exposed to the weather or to rough wear. The soft bricks are selected to be laid for work in sheltered situations. The very slackest baked are returned to the next kiln.—The annular furnace for burning brick, invented by Friedrich Hoffmann of Berlin, is extensively used in Europe, and is said to possess great efficiency and economy. The following description and illustration are taken from Dr. Barnard's report of the Paris exposition of 1867. A large annular chamber, with openings at the sides for the reception of the bricks, is constructed with a central chimney, and with removable divisions for separa-

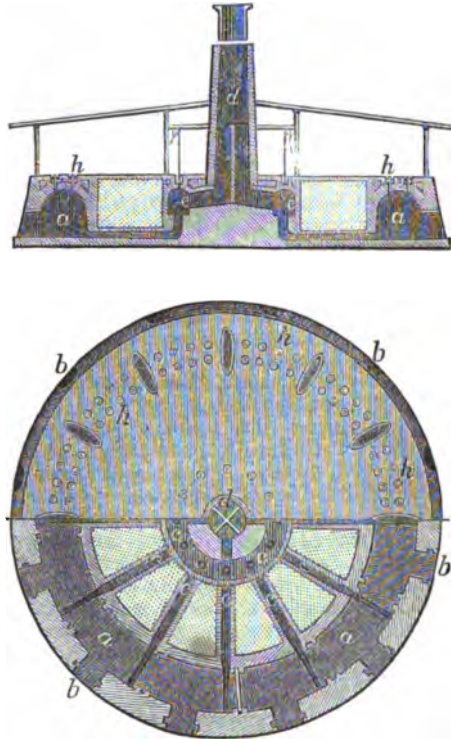


FIG. 1.—Hoffmann's Annular Brick Furnace.

ting the annulus into different parts. When the furnace is filled with unburnt bricks heat is applied to one division, the smoke and hot air escaping into the adjoining one, which is the next to be burnt, the air for maintaining the combustion being received through the compartment last burned, whereby the bricks in it are cooled. Each compartment of bricks or other articles is thus burned in turn, the waste heat of the burning compartment continually drying the compartment before it, and taking all the heat of the one behind. The letters *a*, fig. 1, mark the circular arched furnace, furnished with doors, *b*. Flues, *c*, lead to the circular chamber *e*, surrounding the chimney,

d. Valves of cast iron are made to close at pleasure the orifices of the flues. Movable sluices in the dividing walls allow of communication to be made or closed between the chambers; *h h* are plugs through which the coal, in powder, is introduced, undergoing calcination. The advantages of this furnace lie in its great economy of fuel. The heat is very equable, and no smoke is generated, the fuel being burnt while falling to the bottom of the furnace.—The immense consumption of bricks in cities has made it an important object to reduce the labor employed in their manufacture as much as possible, and consequently much ingenuity has been expended in devising machinery for grinding and moulding the clay. A great number of machines have been patented in this country and in Europe, but it has been found exceedingly difficult to render them practically successful. Two kinds of machines have been made, one by which it is sought to prepare the brick from clay which contains so little moisture that they may be immediately taken to the kiln, and another which moulds it in so soft a state that it requires to be dried before baking. The difficulty with the first method is that the bricks do not seem to possess the strength of those which are made of moister clay, and from the immense power required to press them to the proper size in the moulds some parts of the machinery are liable to break. Those machines which employ moist clay have been utilized in manufacturing pipe and tile and peculiar forms of brick; but in making common brick the saving of labor has not been found sufficient to make them take the place of hand labor, by which process nearly all the bricks used in building are made.—The red color of bricks is owing to the peroxidation of the iron contained in the clay. If the iron is deficient or only partially oxidized through insufficient heat, the bricks are of a pale color. The clay in the vicinity of Milwaukee, Wisconsin, is remarkably free from iron, and the bricks made of it are of a delicate straw color. Other colors may be imparted to brick, provided that of the oxide of iron does not overpower all other coloring matters introduced. American bricks vary in size in the different states, running from $7\frac{1}{2}$ to $8\frac{1}{2}$ inches in length, 4 to $4\frac{1}{2}$ in width, and from $2\frac{1}{4}$ to $2\frac{1}{2}$ in thickness. The weight is commonly reckoned at 4 lbs. to the brick; but this varies with the size, the amount of pressure to which the clay has been subjected, and the heat applied in baking. English bricks are commonly 9 inches long, $4\frac{1}{2}$ wide, and $2\frac{1}{4}$ thick.—*Floating Bricks.* A very light silicious earth is occasionally met with, of which bricks have been made that float upon the water. Clay may be added to the silica, if required to bind the material together. Such bricks were made in ancient times, and were described by Posidonius and Strabo, and particularly commended by Vitruvius, Pollio, and Pliny. In 1791 they were again brought into notice by Giovanni Fabroni in Tuscany,

who after many trials succeeded in making bricks which would float upon water. Their strength was but little inferior to that of ordinary bricks. They are remarkable not only for extreme lightness, but also for their infusibility, and for being very poor conductors of heat. They may be held by one end while the other is red-hot. As an experiment Fabroni constructed the powder magazine of a wooden ship with these bricks. The vessel, being set on fire, sank without explosion of the powder. In 1832 Count de Nantes and Fournet, a mining engineer, used them in constructing powder magazines and other parts of ships, lessening danger from fire. Kützing found the material from which these bricks were made to contain immense numbers of microscopic silicious shells of infusoria. Similar earth has been discovered in France and at Berlin, and it is probably the same whitish substance that is often found under our peat bogs.—*Fire Brick.* When bricks are required to withstand high temperatures, they are made of the most infusible clays, such as contain from 63 to 80 per cent. of silica, with from 18 to 25 per cent. of alumina, and the remainder water. Oxide of iron may be present, but the light color of fire brick shows that this is in very small quantity. Lime would render the mixture fusible, and this is necessarily always absent. Such clays are of common occurrence in the bituminous coal measures, where they are found making the floor or underlying stratum of the coal beds. The material is indurated, so that it is broken up like a soft stone. When used, it is ground in a mill, and mixed with fragments of previously baked fire brick, or of some refractory stone, or with a coarse, clean silicious sand and gravel. The materials are made into a paste with water, moulded in hand moulds, and baked in permanent kilns at a very high temperature. Good clay for fire bricks is also found associated with other clays of more recent formations. The potters' clay formation found at South Amboy, N. J., contains beds of excellent quality, together with others of very pure sand, suitable for mixing with the clay. The manufacture of fire brick has long been carried on at this locality. At Athens, opposite Hudson, on the Hudson river, good fire bricks have long been made. At Bennington, Vt., an excellent clay is found of the character of kaolin, from which fire bricks of very refractory quality are made by mixing with it stones that withstand heat, crushed sufficiently fine. These bricks are extensively employed at the blast furnaces in that part of the country. It is for the lining of such furnaces that fire bricks are principally in demand, and for this use they are prepared of a variety of sizes and shapes, adapted to fit the curves in the lining of the stacks and the arches of the flues. The standard size to which all the larger bricks are referred in reckoning their number, is that of the common rectangular fire brick, which measures 9 inches in length, $4\frac{1}{2}$ in breadth, and $2\frac{1}{4}$ in

width; of these the weight is 7 lbs. These bricks, specially adapted to each pattern, are also employed, as a lining for the anthracite coal stoves so extensively in use in the United States.—*Bricklaying.* The form and proportions of the faces of brick to each other are such that they may be laid in various methods, according as the object is to produce the greatest strength of wall or the most pleasing effects. Ornamental work, as cornices, beads, &c., is produced by causing courses of brick to project beyond the plane of the rest. By the introduction of mortar, bricks, notwithstanding their rectangular shape, are carried round to form arches of any desired curve; they are easily broken also into any required shape by the trowel, and thus are made to receive, if desired, the approximate form of an arch. Fire bricks, as mentioned above, are moulded in shapes for laying curves, as also common bricks for the lining of wells, &c. In laying walls, the first principle to be observed is causing the bricks of successive courses to overlap each other, so that the joint between two is overlaid by the middle of a brick. The courses are thus bound together, and the greatest resistance is offered to any force tending to separate the bricks. As the width of two bricks laid side by side equals the length of one, the position may be reversed with each course, thus securing additional strength. What is called the old English bond method of laying a wall, which is the strongest mode, is to arrange the bricks in alternate courses of stretchers and headers, the former being bricks laid longitudinally with the wall, and the other transversely, presenting their ends or heads only to the face of the wall. Next the corner,

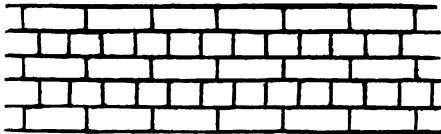


FIG. 2.—Old English Bond.

a quarter brick on the row of headers must be introduced, so that the stretchers overlying may lap to the middle of the second headers. The headers are also called binders, from their effect in binding the bricks of the other courses together. Owing to their presenting a greater number of joints in the face of the wall, their effect is not so pleasing as is that of the stretchers. In New York city, it is required by the fire laws that one course in five shall be headers. This is effected, while stretchers only are seen on the face, by laying every fifth course in what is called herring-bone, breaking off the back corners of the stretchers to let the corners of the brick behind come nearly to the outside line of the wall. In the Flemish bond the bricks are laid alike in each course, a header and stretcher alternating along the course. The effect is more pleasing than the English

bond, but at the sacrifice of some strength. Walls vary in thickness by the difference of the width of a brick. They are 8 inches or the length of a brick thick, 12 inches or a brick

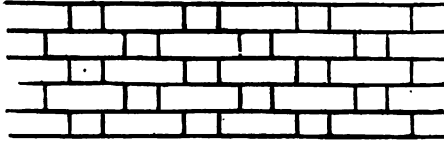


FIG. 3.—Flemish Bond.

and a half, 16 inches or two bricks, and so on. Laid in English bond, all the bricks on one course must be placed in the same direction, even when the wall turns at right angles; and in turning the corner no two bricks must be arranged side by side, but the end of one must lap to the middle of the next contiguous to it, excepting when the quarter brick is introduced at the corner to prevent a continued upright joint in the face work. The work is strengthened by the occasional introduction of pieces of hoop iron, which bind it together. If bricks were laid dry, they would absorb the moisture of the mortar, and the pores being filled with air and the surface covered with dust, there would be no adhesion; but when the bricks are wet and the mortar moist, the evaporation makes the attachment complete. As the wall is built up, no part should at any time reach more than four or five feet above the rest; for unless all upon the same level settles together, cracks will be produced where the newer work is joined upon the older. In attaching new walls to old, a brick in every other course of the old work is drawn and the new work is toothed in.

BRIDAINE, Jacques, a French preacher and missionary, born at Ohuslan, March 21, 1701, died at Roquemaure, Dec. 22, 1767. He studied for the priesthood in the Jesuit college at Avignon, and the seminary of the royal missions of St. Charles of the Cross in the same town, and on taking orders began to preach at Aignes-Mortes. Failing to secure a large congregation by ordinary means, he one day went into the streets ringing a bell, and continued to walk through the town until he had collected nearly all its inhabitants, whom he induced to follow him to church. Here he addressed them with extraordinary eloquence, and from that time he enjoyed a constantly increasing reputation. He travelled through the villages of the south of France, and his "missions" to different towns reached the number of 256. He was asked to go to Paris, and delivered there, in the church of St. Sulpice, a sermon on eternity, rousing the audience to the highest pitch of excitement, and making, as it has been described, "a terrible impression" on all who heard him. His language was simple, direct, and often rough; but his power over an audience was remarkable. There is a complete edition of his sermons (5 vols., Avignon, 1821).

BRIDGE, a structure, with one or more transverse apertures, for passing a river, canal, or valley, and formed of various materials, as timber, stone, or iron. The construction of perfect bridges is a complex operation, and among ancient nations, even of the highest civilization, did not always keep pace with the progress of the other arts. The type of the primitive bridges of earlier ages is to be found at the present day among rude and uncultivated nations, and consists simply of lintels of wood stretching from bank to bank, or, when the span renders this impracticable, resting on piers or posts fixed in the bed of the river. The inevitable frequency of these in a rapid stream, and consequent contraction of the waterway, would result in a torrent injurious to navigation, and destructive to the piers themselves; hence it would be found essential to the stability of such structures that the openings should be sufficiently wide to allow every facility for the passage of the water, and as this could only be effected by arches or trusses, it is evident that these inventions were perfected before bridges of any magnitude became common. One of the most extraordinary bridges of ancient times was that which, according to Herodotus, Queen Nitocris constructed over the Euphrates at Babylon, and the length of which is given by Diodorus Siculus as five furlongs; the construction of this bridge is supposed to have been of the kind just alluded to, viz., with lintels or architraves extended from pier to pier. The bridges of Darius upon the Bosphorus, Xerxes upon the Hellespont, Cæsar upon the Rhine, and Trajan upon the Danube, are celebrated in history, but were all constructed for purposes of war. The first examples of stone bridges that we can find are those constructed by the Romans. An exception may perhaps be made in regard to the Chinese, as we are not positively acquainted with the date of many of their structures; but in Egypt and India, the birthplaces of so many of the arts and sciences, arched bridges were entirely unknown; neither do we meet with them in the ancient remains of Persia or Phœnicia; and even in Greece, at the period when her architecture was the finest in the world, and when Pericles had adorned Athens with splendid edifices, her people were unprovided with a bridge over the Cephissus, notwithstanding it crossed the most frequented thoroughfare to the city. The principal bridges of Rome were the following: 1. The Pons Sublicius, the first built over the Tiber, and memorable from its defence by Horatius Coclès against Porsena; it was twice rebuilt, and the ruins of the last structure are still visible. 2. The Pons Triumphalis, sometimes termed Pons Vaticanus, from its proximity to the Vatican; it derived its former name from being the bridge over which those to whom the senate decreed a triumph passed on their way to the capitol. 3. The Pons Fabricius, named from its founder, L. Fabricius, *curator viarum*, who erected it during the period

of Catiline's conspiracy. 4. The Pons Cestius, built in the reign of Tiberius, and named from Cestius Gallus. 5. The Pons Janiculi, which led from the Campus Martius to the Janiculum. 6. The Pons Ælius, erected in the reign of the emperor Ælius Hadrianus; it is said this bridge had originally a roof of bronze, supported by forty columns, but was despoiled during an incursion of the barbarians. Clement IX., who restored the bridge, placed on it ten colossal statues of angels, carved in white marble, whence is derived its present name, Ponte San Angelo. 7. The Pons Milvius, built in the time of Sulla, on the ancient Via Flaminia, at a short distance from the city; on this bridge Cicero arrested the Allobrogian ambassadors who were the bearers of letters to Catiline, and here also occurred the celebrated victory of Constantine over Maxentius, when Constantine had the miraculous vision of the cross. 8. The Pons Senatorius or Palatinus, still remain-



FIG. 1.—Pons Senatorius.

ing, though in ruins, near the Palatine hill.—From the fall of the Roman empire, we have for several centuries no account of any bridges worthy of note, except those built by the Moors in Spain, one of the finest of which was the bridge of Cordova, over the Guadalquivir, built by Hashem or Issem, the son and successor of Abderrahman, the first of the Moorish kings of Spain. One of the most ancient bridges of modern Europe is that over the Rhône at Avignon. It was built by a religious society called the "Brethren of the Bridge," which, according to Gantier, "was established upon the decline of the second and commencement of the third race of kings, when the state fell into anarchy, and there was little security for travellers, particularly in passing rivers, on which they were subject to the exactions and rapacities of banditti." This society was founded with a view to remedy these evils, by forming fraternities for the object of building bridges, and establishing ferries and caravansaries on the banks of the most frequently crossed rivers; their first establishment was on the Durance, at Maupas, which name was afterward changed to Bonpas, in acknowledgment of their services. The bridge at Avignon was commenced in 1176, and completed in 1188. The association soon after built the bridge of Lyons, composed of 20 arches, and that of Saint Esprit, over the Rhône, of 19 arches, besides many other structures of less note. One of the oldest bridges in England is that of Croyland in Lincolnshire; it is formed by three semicircles which succeed each other, and are based upon a central arch; the ascent is so steep that only foot passengers can accomplish it. The bridge at Burton over the Trent, now partly removed, was the longest in England, and was built in the 12th

century; it had 36 arches of squared freestone, and was 1,545 ft. in length. The first stone bridge over the Thames, known as the old London bridge, was commenced in 1176 by Pe-

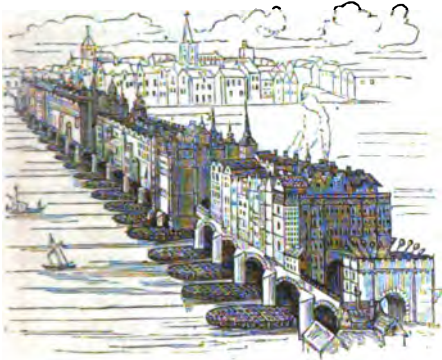


FIG. 2.—Old London Bridge in 1616.

ter of Colechurch, who is supposed to have belonged to the Brethren of the Bridge; Peter died before the completion of his work, and was buried in the crypt of the chapel erected on the centre pier; this was in accordance with a custom of the society, that when any member died during the superintendence of an important work, his remains should be entombed within the structure; the work was completed in 1209, during the reign of King John, and was chiefly remarkable for its massiveness, and enormous surplus of material, having 20 arches in a span of 940 ft., with piers varying in solidity from 25 to 34 ft., so that two thirds of the stream was occupied by the piers, and at low water a still greater proportion, leaving at that time less than one fourth of the whole span for waterway, and causing a most dangerous fall. The bridge of the Holy Trinity at Florence, over the Arno, was built in 1569; it has a total length of 322 ft., is composed of three elliptical arches, and stands unrivalled as a work of art; the material used in its construction is white marble. The Rialto at Venice, designed by Michel Angelo, and erected in 1588-'91, has a single span of 98½ ft., with 28 ft. rise. The total number of bridges in that city was estimated by Gautier at 340. The bridge of Pont-y-Prydd, over the



FIG. 3.—Bridge of Pont-y-Prydd.

Taff in Wales, is considered one of the most extraordinary in Britain; it was built in 1755, by an uneducated mason named Edwards, after the failure of two structures which he had

previously erected at the same spot; the first was carried away by a freshet after standing two and a half years, and the second failed in consequence of the weight on the haunches forcing out the keystone before the parapet was finished; the present structure consists of a single circular arch, with a span of 140 ft. and a rise of 35 ft. The bridge of Mantes, over the Seine, was erected by Perronet and Housseau in 1765, and consists of three elliptical arches, the centre one having a chord of 128

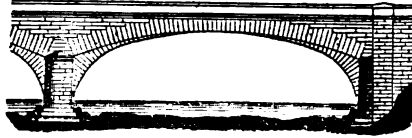


FIG. 4.—Bridge of Neuilly.

ft. The famous bridge of Neuilly was constructed by Perronet in 1774; its total length is 766 ft., with a clear waterway of 639 ft.; there are five arches of equal width, the curves being false ellipses, with chords of 128 ft. and versed sines of 32 ft. The bridge of St. Maixence, over the Oise, was also built by Perronet between 1774 and 1785; it is chiefly remarkable for the flatness of its arches, the chords being 76 ft. 8 in., while the versed sines are only 6 ft. 3 in., and the thickness of the voussoirs at the vertex of the arch 4 ft. 8 in. Waterloo bridge, over the Thames in London, built by Rennie in 1811-'17, is 1,240 ft. in length, and composed of nine elliptical granite arches, each of 120 ft. span, and a versed sine of 32 ft.; the piers are fronted with coupled Doric columns, producing an elaborate effect; another peculiarity is that the roadway is level, differing in this respect from the other bridges across the Thames. Westminster bridge, completed in 1750, by Labeledy, is remarkable as inaugurating a new era in bridge architecture; the novelty consisted in the manner of laying the foundations, which was effected by means of caissons, the depth of water and rapidity of the current rendering the expense of coffer-damming un-



FIG. 5.—New London Bridge.

desirably great; the bridge is 1,220 ft. in length, and has in all 15 semicircular arches, two of which, however, are quite small. The new London bridge is an imposing structure of granite, and was completed by Rennie in 1831; it has a total length of 928 ft., with five elliptical arches, the span of the centre arch being 152 ft., and its versed sine 29 ft. 6 in. In the United States there are comparatively few stone bridges of great size. Perhaps the finest example we have is the High bridge of the Cro-

ton aqueduct, over the Harlem river at New York; its total length is 1,480 ft., and the top of the parapet is 116 ft. above high water; there are in all 15 semicircular arches, 8 of which are of 80 ft. span, and 7 of 50 ft. (See AQUEDUCT.)—The arches of bridges are of three principal kinds: 1. The semicircular; these were anciently most in use, and have the advantage of being easy to construct, and forming a solid structure; their span is, however, restricted, on account of the great relative height of this form of arch, and as they are usually made of moderate size, they have the inconvenience of considerably obstructing the passage of the water. 2. Arches of a flat vault, either forming portions of an ellipse, or else described by several arcs of circles of different radii. Elliptical arches are pleasing to the eye, but troublesome to construct, on account of the continual change in the form of the successive voussoirs; hence it is usual to employ curves composed of a certain number of arcs of circles, varying generally from three to eleven. The use of flat-vaulted arches was introduced into France about the close of the 17th century, and their adoption was due to the necessity of affording a wider discharge without considerably augmenting the height of the arches. This form not only answers this object effectually, but, when the two diameters are not very unequal, presents as much solidity and facility in construction as the semicircular arch. 3. Arches formed from an arc of a circle, which are of two principal kinds: first, those in which the springing planes are under water, examples of which are seen in the bridge of Saint Esprit, and the ancient bridge of Avignon; this form has the disadvantage of greatly reducing the discharge. In the second kind the springing planes are on a level with the highest water of the river, as in the bridge de la Concorde at Paris. In this case the arc is necessarily very low, and the lateral pressure of the voussoirs so considerable as to require great care in the construction. Besides the three of which we have spoken, there is the Gothic arch, composed of two arcs of a circle, sometimes though rarely employed; it has the fault of greatly reducing the outlet. Though the size of the arches is usually determined by local circumstances, yet there are a few general principles to be considered. Small arches are best adapted to quiet rivers, whose waters do not rise to any considerable height, while large arches are best suited to torrents, where it is difficult to lay the foundations, and where the piers are exposed to damage by obstacles brought down against them by the current. Arches of stone cannot be applied, however, to the wide rivers of Europe or America. In fixing the width of arches two plans are pursued: in one, the apertures are all equal, giving the tops of the vaults the same elevation above the water, and enabling the constructor to use the same centering for all the arches. The economy of this arrangement may, however, be counterbalanced

by the necessity of forming considerable embankments at the termini of the structure. In the other plan, the diameters of the arches are unequal, allowing a reduction of the embankments, thus diminishing the obstacles to the approaches. The advantages of both systems are sometimes combined by forming the arches of the same width, and placing the springing planes at heights decreasing from the centre to either extremity of the bridge. The breadth of the bridge depends wholly on the locality, and should be proportioned to the importance of the road on which it is built. For country roads a width of 14 to 16 ft. will be sufficient, particularly if the bridge be a short one. On what are termed roads of the second class, 20 to 25 ft. should be allowed, which will afford sufficient room for two carriages to pass at once, besides a space for foot passengers. On roads of the first class, 30 to 35 ft. is considered a fair allowance, while in the interior of cities from 30 to 60 ft. will be required. The Pont Neuf at Paris, which is perhaps one of the greatest thoroughfares in the world, has a width of about 70 ft. between the parapets.—Timber, as a material for bridges, is much less costly and more easily worked than stone; but all such structures lack the advantage of durability, and are more troublesome to keep in repair. The oldest wooden bridge of which we have any account is the Pons Sublicius already mentioned; it is supposed that no iron whatever was used in its construction. Cæsar's bridge was also of wood, and so was Trajan's across the Danube, though it is probable that the piers of the latter were of stone. One of the most famous wooden bridges on record is that of Johann Ulrich Grubenmann, an uneducated carpenter of Switzerland; it was built at Schaffhausen in 1757, and was composed of two wooden arches with the respective spans of 193 and 172 ft., supported at either terminus by abutments, and at their junction by a stone pier. After Grubenmann's death the bridge began to settle, as the oak beams, which had been placed too low, and not sufficiently exposed to the air, rotted at their points of contact with the stone abutments. Owing to the peculiar arrangement of the structure, by which the principal supports were so intimately connected together, it became necessary to support the whole bridge before a single part could be removed; this was performed by means of screw jacks, and the decayed timbers replaced. No other repairs were ever required, and the bridge excited much attention as a remarkable specimen of carpentry. It was burnt by the French in 1799, having lasted 42 years. In modern times, the wooden bridges of Germany and France have taken high rank from their scientific combination in arrangement, but during the last few years the United States have justly claimed the precedence for simplicity, mechanical perfection, and boldness of design. The upper Schuylkill bridge at Philadelphia has the remarkable span of 340 ft. It was de-

signed and built by L. Wernwag, and consists of five ribs, each formed of a curved, solid-built beam, connected with an upper single beam by radial pieces, diagonal braces, and in-

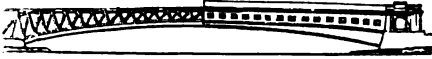


FIG. 6.—Schuylkill Bridge.

clined iron stays. In the Trenton bridge, the roadway bearers are suspended from curved, solid-built beams, by iron bar chains and suspension rods; it consists of five spans, the central and widest being 200 ft. Burr's plan, which at one time received considerable favor on railroads and aqueducts, particularly in Pennsylvania, consists essentially of open-built beams of straight timber, connected with curved, solid-built beams, termed arch timbers, and which are formed of several thicknesses of scantling, between which the framework of the open-built beam is clamped. Town's plan, commonly known as the lattice truss, consists of two main strings, each formed by two or three parallel beams of two thicknesses, breaking joints with a series of diagonal pieces, crossing each other and inserted between the parallel beams, being connected with the strings and

with each other by treenails. As the timbers are of a uniform cross section and length, the construction is simple and economical, though the plan is not well adapted to the resistance of variable strains and jars. Long's truss consists in forming the upper and lower strings of three parallel beams, between which are inserted the cross pieces, or posts, which are formed of beams in pairs, placed at regular intervals along the strings, and connected with them by wedge blocks; between each series of posts are placed braces and counterbraces, suitably connected by treenails, and in long spans arch braces are also introduced. In Howe's truss, the upper and lower strings are each formed of several thicknesses, breaking joints, while on the upper side of the lower string, and the lower side of the upper, are placed blocks of hard wood or cast iron, inserted in notches, and bevelled on each side to form a support for the braces and counterbraces; through the blocks are passed bolts of iron to connect the two strings, and by means of a nut and screw any desired amount of tension can be given to the truss. The preceding combinations are those which are in general use in the United States. One of the most remarkable wooden bridges is that at Havre de Grace, over the Susquehanna river; this is 3,271 ft. long, divided

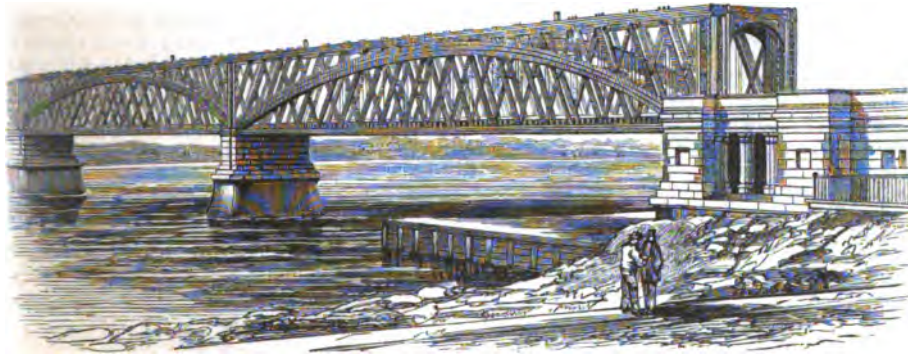


FIG. 7.—Bridge over the Susquehanna at Havre de Grace.

into 12 spans, resting upon granite piers. It is constructed upon Howe's plan, and combines great lightness and strength. There are many works of this character throughout the country, where, owing to the cheapness of timber, they can be built with great economy. The practice of American engineers in this class of structures has been taken as a guide in similar works throughout the world. The modern tendency is, however, toward the substitution of iron and steel for timber.—Suspension bridges are of very remote origin. Kirchen, in his "China Illustrated," mentions one which is still to be seen in the province of Yun-nan, and according to tradition was built by the emperor Ming in A. D. 65; it is formed of chains, supporting a roadway of plank resting directly upon them, and is 330 ft. in length. The ancient Peruvians

also constructed numerous bridges over the Andes, the principal material being ropes formed of the bark of trees; sometimes a roadway was constructed, and at others the transit was effected by means of a basket supported by the rope, and drawn over alternately from one side to the other. The same plan is used at the present day. Rope suspension bridges have also been used in Europe; they were employed in France, at the siege of Poitiers, to cross the river Clain, and Douglass mentions their use in Italy in 1742. Iron suspension bridges of large span, however, are of modern date. The first of this kind erected in England was in 1819, and was built across the Tweed at Berwick by Capt. Sir Samuel Brown; it was constructed with chain cables, 12 of which were used in all, six being placed on

either side of the roadway; its span was 449 ft. and versed sine 30 ft. The same engineer constructed the Brighton chain pier, and the bridge at Montrose. The former was built in 1823, and destroyed by a gale of wind in November, 1836; its entire length was 1,136 ft., in four openings, each of 255 ft. span and 18 ft. deflection. The latter was erected in 1829, and in October, 1838, the roadway was totally destroyed by a hurricane; Mr. Rendell reconstructed it, and materially stiffened the structure by the system of trussing he adopted. The bridge over the Menai strait, by Telford, was built in 1819-'25; its span was 580 ft., and the clear height of the roadway above the water 102 ft.; it was seriously injured by a violent gale, which produced so great an oscillation of the main chains as to dash them against each other and break off the rivet heads of the bolts; a recurrence of the accident was provided against by suitable bracing, and the iron roadway beams strengthened by an additional number constructed of timber, as it was found that the former were frequently bent and even broken by the undulations of the bridge in a gale. The Conway bridge was also built by Telford, being completed in 1826; it crosses an estuary that divides the towns of Bangor and Chester; its span is 327 ft., with a deflection of 22½ ft. The Hammersmith bridge over the Thames was built by Tierney Clark in 1824-'7, and has a span of 422 ft. One of the most remarkable suspension bridges in Europe is that of Fribourg in Switzerland; the cables are of wire, and the span is 870 ft.; it was erected in 1831-'4 by M. Chaley; the roadway is 174 ft. above the surface of the river, and although the whole is remarkably light and fragile in appearance, it has withstood several severe tests uninjured, and is still considered a safe bridge. The Pesth suspension bridge over the Danube was com-

menced in 1840 by Tierney Clark, and opened in 1849, when it was crossed by a part of the Hungarian army retreating before the Austrians, and followed immediately by the latter, both armies with their heavy trains of artillery, ammunition, and baggage wagons; it is estimated that of the Austrian troops alone 30,000 crossed the bridge in two days; the clear waterway is 1,250 ft., and the centre span 670 ft., while the towers are 200 ft. in height from the foundations. In the United States, the first suspension bridges were built by Mr. Finley between 1796 and 1810, and were all of small dimensions, and constructed with chain cables. During the last 25 years, however, a large number of structures have been erected, and some of great size; the plan of wire cables has been universally adopted in their construction. The Wheeling bridge over the Ohio was built in 1848, by O. Ellet, and blown down in May, 1854; its span was 1,010 ft. The Belview bridge at Niagara, a slight structure, was built by the same engineer in 1848, and had a span of 759 ft.; it was removed in 1854, and its cables incorporated in the bridge constructed by Mr. Roebling. One of the finest structures of this kind in the country, and perhaps in the world, is Roebling's railway bridge at Niagara; its span is 821 ft., and deflection 59 ft.; 14,560 wires are employed in the cables, and their ultimate strength is estimated at 12,000 tons: the elevation of the railway track above the water is 245 ft., and so great is the stiffness of the roadway that the passage of ordinary trains causes a depression of only three to four inches; the bridge was completed in 1855, and, though continually subjected to the passage of heavy trains, has thus far proved a complete success. This able engineer has added to his fame by the construction of a suspension bridge over the Ohio river at Cincinnati. It has a total



FIG. 8.—Suspension Bridge over the Ohio at Cincinnati.

length of 2,220 ft. and a clear span of 1,057 ft., and is 108 ft. above low water in the river. The two cables supporting the roadway are 12½ inches in diameter. A still more remarkable work of this kind was designed by Roebling to connect New York city and Brooklyn, and is now (1873) in process of construction, under the charge of his son, Washington A. Roebling. It will be 3,475 ft. long between the anchorages, with a clear span over

the East river of 1,595 ft., the bottom chord of which will be 135 ft. above the water. The superstructure will consist of an iron framing 85 ft. wide, suspended from four main cables, each 16 inches in diameter, composed of galvanized cast-steel wire, having a strength of 160,000 lbs. per square inch of section. The aggregate strength of the main span will be 5,000 tons.—Cast-iron bridges are of recent origin. The first that was erected in England

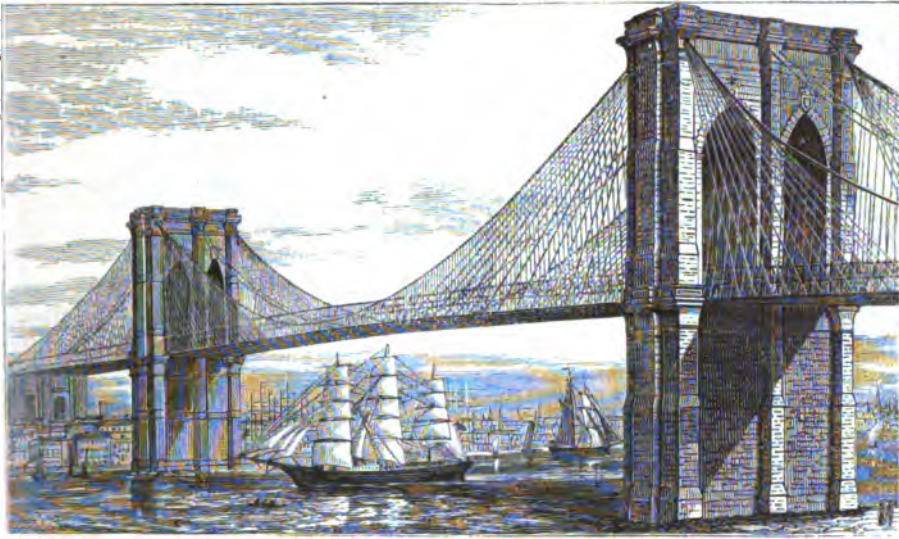


FIG. 9.—New York and Brooklyn Suspension Bridge.

was at Colebrook Dale in 1779, and consists of five curved ribs, nearly semicircular in shape, and each formed of three concentric arcs, connected by radial pieces; its span is 100 ft., and rise 40 ft. The Wearmouth bridge was built in 1790, and has a striking appearance from its great span as well as height above the water; it is 100 ft. above high-water level, and has a span of 240 ft., with a rise of 30 ft. The pont d'Austerlitz, at Paris, has five arches, each with a span of 107 ft., and a rise of $\frac{1}{16}$ the span; it was erected in 1801-'7 by Lamande. The pont du Carrousel, in the same city, was built by Polonceau in 1838, and consists of three arches, with a span of 150 ft., and a rise of 16 ft. The largest iron arch bridge is the Southwark bridge over the Thames, built by Rennie in 1815-'19; it consists of three arches, 240 ft. in span, and with a rise of 24 ft. A remarkable cast-iron bridge, combining the purposes of viaduct and aqueduct, was designed and constructed by Capt. M. C.



FIG. 10.—Washington Aqueduct Bridge.

Meigs, for the purpose of carrying the Washington aqueduct over Rock creek, between Georgetown and Washington; the peculiarity of this bridge is that its arches are constructed of cast-iron pipes, which carry the roadway and the water supply at the same time; its span is 200 ft., its rise is 20 ft., and the diameter of the two pipes of which it is formed is 4 ft. in the clear.—Of wrought-iron bridges, the

Britannia and Conway tubular bridges, both erected by Stephenson, are widely celebrated. The Britannia bridge crosses the Menai strait at 103 ft. above high water, and consists of four spans, two of 280 ft. each, and two of 459 ft., forming a huge tube of wrought iron, through which passes the Chester and Holy-



FIG. 11.—Britannia Bridge.

head railway. The Conway bridge has a single span of 400 ft., and is only 18 ft. above the level of high water; it was finished in 1848, and the Britannia bridge in 1850. The tubes were constructed, in each instance, at a distance from their respective destinations, and afterward floated to their places by pontoons, and raised by hydraulic presses, forming the most gigantic application ever made of these powerful machines. The Victoria railway bridge, over the St. Lawrence at Montreal, constructed after the plan of the Britannia bridge, is two miles long, cost over \$5,000,000, and contains 10,500 tons of iron and 8,000,000 cubic feet of masonry. Since 1860 many iron viaducts have been built in the United States. Among the most notable of these are the rail-

road bridge across the Ohio river at Louisville, constructed under the supervision of Mr.



FIG. 12.—Lattice Girder.

Albert Fink, and in accordance with the system known by his name, the essential feature of which is that the bridge carries its load



FIG. 13.—Lattice Girder.

by the aid of suspension rods, and at the same time possesses the stiffness of a truss. The

length of this bridge is 5,218½ ft., divided into 25 spans, supported by 24 stone piers. Its entire cost was \$2,016,819. Its height is about 96½ ft. above low water. Its width is about 27 ft. The drawing (fig. 15) will show at a glance the peculiarities of this structure. The railroad bridges over the Mississippi river at Quincy,

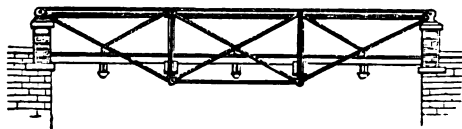


FIG. 14.—Modified Fink trussed Girder.

Keokuk, and Burlington, and over the Missouri river at St. Charles, are good examples of truss bridges constructed exclusively of wrought iron.—Many modifications have been made in the form of the truss since the substitution of iron for wood. A very remarkable bridge, the superstructure of which is mainly composed of

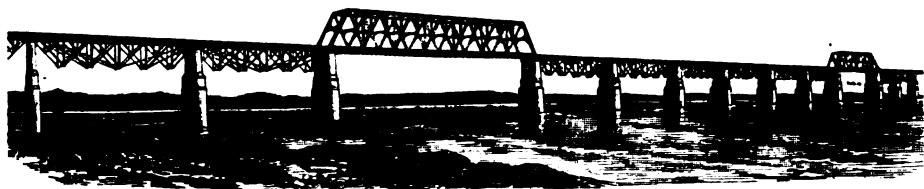


FIG. 15.—Vladuct Bridge at Louisville.

steel, is now (1873) in the process of construction over the Mississippi river at St. Louis. It was designed by James B. Eads, and was begun in 1869. The piers, four in number, are composed of granite and limestone, and rest on the bed rock of the river, to which they were sunk through the sand, in one case as much as 120 ft., by the use of wrought-iron caissons and atmospheric pressure. There will be one span of 520 and two spans of 515 ft. each over the waterway. The rise of the arches

is 60 ft., sufficiently high to permit the passage of steamboats at all stages of water. The two roadways, one for railways and one for carriages, will be carried by four arched trusses connected with each other by diagonal braces, the top and bottom chords of which are composed of steel tubes 16 inches in diameter. These tubes are made in sections of about 12 ft., and consist of steel staves, banded and held together by jackets or hoops of the same material; the segments being con-

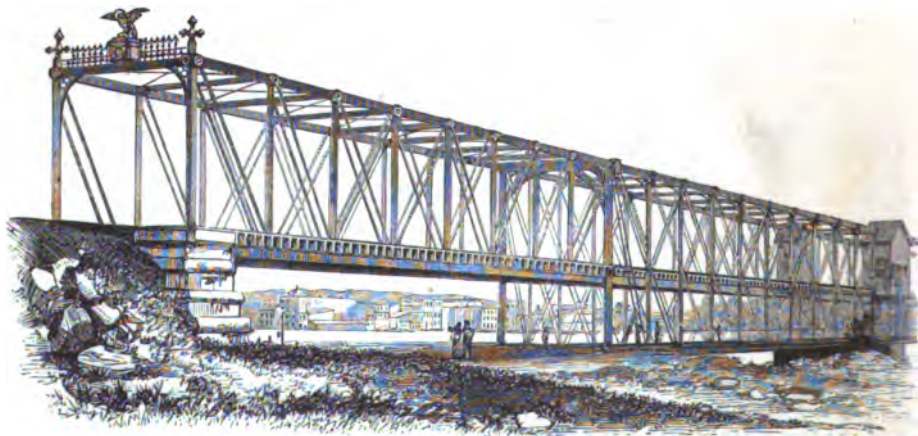


FIG. 16.—Truss Bridge at Rock Island.

ned with each other by steel thimbles or couplings, accurately fitted and firmly secured over and about the joints. The top and bottom chords or tubes are 12 ft. apart, connected with each other by a triangular system of bra-

cing so arranged as to constitute, with the tubes, an arched truss of great lightness and strength. The width of this bridge is 54 ft., and its cost, together with the tunnel under the city of St. Louis by which access is gained to its western



FIG. 17.—St. Louis Bridge.

end, will be about \$9,000,000. (See fig. 17.)—Movable bridges are of several kinds, and receive different names from the manner in which they are constructed and operated. The term is usually applied to a platform properly supported between two points of a fixed bridge, and so constructed as to be readily removed and replaced. Drawbridges are those which are raised or lowered by means of a horizontal axis and counterpoise connected with the platform. Turning or swinging bridges are those which turn horizontally about a vertical axis, while rolling bridges are those which rest upon rollers, and can be propelled horizontally on them, so as to close or open the passage. We sometimes meet with a still different class of movable bridges, where the platform is supported by boats, or any other buoyant body, and which can be introduced in the waterway, or withdrawn from it, at convenience.

BRIDGE, Military. The art of constructing temporary bridges for the passage of troops across large rivers and narrow arms of the sea, was well known to the ancients. Darius passed the Bosphorus and Danube, and Xerxes the Hellespont, by bridges of boats. The army of Xerxes constructed two bridges across the latter strait, the first of 860 vessels, anchored head and stern alongside each other, their keels in the direction of the current, the vessels connected with each other by strong cables, over which planks were laid, fastened by a rail on either side, and covered in by a bed of earth. The second bridge had 314 vessels, and was similarly constructed. According to Arrian, Alexander had a regular pontoon train of light boats attached to his army. The Romans had wickerwork vessels, covered with hides, destined to support the timber platform of a bridge; these formed a part of the train of their armies until the end of the empire. They, however, also knew how to construct a more

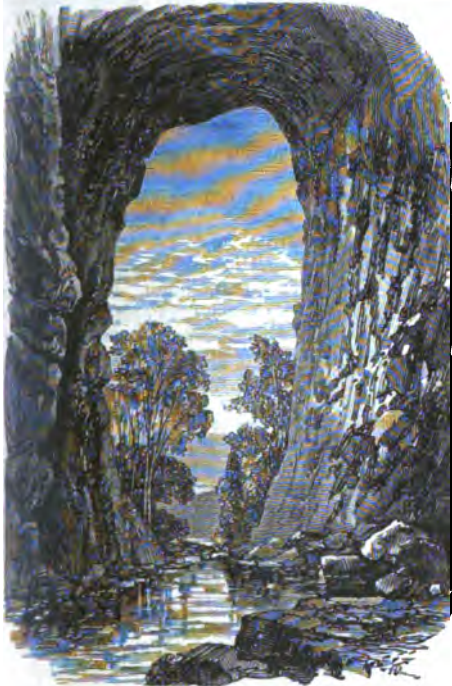
solid kind of military bridge, whenever a rapid river had to be crossed; witness the famous bridge on piles, on which Cæsar passed the Rhine from Gaul into Germany in 55 B. C. The bridge was built, according to the best authorities, somewhere in the region between Coblenz and Andernach. Its construction occupied the army for ten days. During the middle ages we find no notice of bridge equipages, but during the thirty years' war the various armies engaged carried materials with them to form bridges across the large rivers of Germany. The boats used were very heavy, and generally made of oak. The platform of the bridge was laid on trestles standing in the bottoms of these boats. The Dutch first adopted a smaller kind of vessel, flat-bottomed, with nearly vertical sides, pointed head and stern, and both ends projecting, in an inclined plane, above the surface of the water. They consisted of a framework of wood, covered with sheets of tin, and were called pontoons. The French, too, according to Foulard, claim the invention of pontoons made of copper, and are said to have had about 1672 a complete pontoon train. By the beginning of the 18th century all European armies had provided themselves with this kind of vessels, mostly wooden frames, covered in with tin, copper, leather, or tarred canvas. The latter material was used by the Russians. The boats were small, and had to be placed close together, with not more than 4 or 5 ft. clear space between them, if the bridge was to have any buoyancy; the current of the water was thereby greatly obstructed, the safety of the bridge endangered, and a chance given to the enemy to destroy it by sending floating bodies against it. The pontoons now employed by the continental armies of Europe are of a larger kind, but similar in principle to those of 100 years ago. The French have used since 1829 a flat-bottomed vessel with nearly vertical sides, di-

minishing in breadth toward the stem, and also, but a little less, toward the stern; the two ends rise above the gunwales and are curved like those of a canoe. The dimensions are: length, 81 ft.; breadth at top, 5 ft. 7 in.; at bottom, 4 ft. 4 in. The framework is of oak, covered with fir planking. Every pontoon weighs 1,658 lbs., and has a buoyancy (weight of cargo which would sink the vessel to the top of the gunwales) of 18,675 lbs. When formed into a bridge, they are placed at intervals of 14 ft. clear space from gunwale to gunwale, and the road of the bridge is 11 ft. wide. For the advanced guard of an army a smaller kind of pontoon is used, for bridging over rivers of less importance. The Austrian pontoons are similar to the larger French pontoon, but divided transversely in the middle for more convenient carriage, and put together in the water. Two vessels placed close alongside each other, and connected by short timbers, a longitudinal timber supporting the balks of the platform, constitute a floating pier of a bridge. These pontoons, invented by Birago, were introduced in 1823. The Russians have a framework of wood for their pontoons, so constructed that the centre pieces, or thwarts, may be unshipped; over this frame is stretched sail cloth, covered with tar or a solution of india rubber. They are in length 21 ft. 9 in., breadth 4 ft. 11 in., depth 2 ft. 4 in., and weigh 718 lbs. each. Breadth of road of bridge, 10 ft.; distance from pontoon to pontoon, 8 ft. The Russians also have pontoons with a similar framework, covered over with leather. The Prussians are said to have been the first to divide their pontoons transversely into compartments, so as to prevent one leak from sinking them. Their pontoons are of wood and flat-bottomed. The span or clear distance between the pontoons, in their bridges, varies from 8 to 16 ft., according to circumstances. In all continental armies small boats to carry out the anchors accompany the pontoon train. Pontoons of inflated india rubber were introduced in the United States army in 1846, and used in the war against Mexico. They are easily carried, from their lightness and the small space they take up when folded; but besides being liable to be damaged and rendered useless by friction on gravel, &c., they partake the common faults of all cylindrical pontoons, and have been discarded both by the United States and England. —A pontoon train contains, besides the pontoons, the oars, boat hooks, anchors, cables, &c., necessary to move them about in the water, and to fix them in their position, and the balks and planks (chesses) to form the platform of the bridge. With boat pontoons, every pontoon is generally secured in its place, and then the balks and chesses stretched across; with cylindrical pontoons, two are attached to a raft, which is anchored at the proper distance from the end of the bridge, and connected with it by balks and chesses. Where circumstances admit of it, whole links, consisting of three,

four, or five pontoons bridged over, are constructed in sheltered situations above the site fixed on for the bridge, and floated down successively into their positions. In some cases, with very experienced pontoniers, the whole bridge has been constructed on one bank of the river and swung round by the current when the passage was attempted. This was done by Napoleon when crossing the Danube, the day before the battle of Wagram. —Pontoon trains are, however, not always at hand, and the military engineer must be prepared to bridge over a river, in case of need, without them. For this purpose a variety of materials and modes of construction are employed. The larger kind of boats generally found on navigable rivers are made use of for bridges of boats. If no boats are to be found, and the depth or configuration of bottom of the river renders the use of floating supports necessary, rafts of timber, floats of casks, cotton bales, and other buoyant bodies may be used. If the river is shallow, and has a hard and tolerably level bottom, standing supports are constructed, consisting either of piles, which form the most durable and the safest kind of bridge, but require much time and labor, or of trestles, which may be easily and quickly constructed. Sometimes wagons loaded with fascines, &c., and sunk in the deeper places of the river, will form convenient supports for the platform of a bridge. Inundations, marshes, &c., are bridged over by means of gabions. For narrow rivers and ravines, where infantry only have to pass, various kinds of suspension bridges are adopted; they are generally suspended by strong cables. —The construction of a military bridge under the actual fire of the enemy is now a matter of but rare occurrence; yet the possibility of resistance must always be provided for. On this account the bridge is generally constructed in a reëntering bend of the river, so that the artillery placed right and left sweeps the ground on the opposite bank close to where the bridge is to land, and thus protects its construction. The concave bank, moreover, is generally higher than the convex one, and thus in most cases the advantage of command is added to that of a cross fire. Infantry are rowed across in boats or pontoons, and established immediately in front of the bridge. A floating bridge may be constructed to carry some cavalry and a few light guns across. The division of the river into several branches by islands, or a spot immediately below the junction of some smaller river, also offers advantages. In the latter, and sometimes in the former case, the several links of the bridge may be composed in sheltered water, and then floated down. The attacking party, having commonly to choose between many favorable points on a long line of river, may easily mislead his opponent by false attacks, and then effect the real passage at a distant point; and the danger of scattering the defending forces over that long line is so great, that it is pre-

ferred to keep them concentrated at some distance from the river, and march them in a body against the real point of passage as soon as it has once been ascertained, and before the enemy can have brought over all his army. It is from these causes that in none of the wars since the French revolution has the construction of a bridge on any of the large rivers of Europe been seriously contested.

BRIDGE, Natural. I. In Rockbridge co., Virginia, 115 m. W. of Richmond, and 160 m. S. W. of Washington. It is distant by stage road from Lexington, the capital of the county, 14 m.; is 30 m. from Bonsack's, the nearest station on the Virginia and Tennessee railroad, and 36 m. by canal boat from Lynchburg. It is situated at the extremity of the deep chasm in which flows the little stream



Arch of the Natural Bridge of Virginia.

called Cedar creek, across the top of which, from brink to brink, there extends an enormous rocky stratum, fashioned into a graceful arch. The bed of the stream is more than 200 ft. below the surface of the plain, and the sides of the chasm, at the bottom of which the water flows, are composed of solid rock, maintaining a position almost perpendicular. The walls do not seem to be water-worn, but suggest the idea of an enormous cavern, that in remote ages may have been covered for miles by the continuation of that stratum of which all that now remains is the arch of the natural bridge. A plumb line dropped from its centre down the vertical face of the rocks

swings clear at the depth of 40 ft., which is the thickness of the crown of the arch. Toward its sides this regularly increases with a graceful curve, as in an artificial structure. Its breadth is full 60 ft., and the stone is a highly silicious limestone, extremely hard to break, formed in massive blocks and strata, with no evidence upon its weathered surface of a tendency to decompose and crumble away. It is thus apparent that the insignificant little stream which now runs in this deep gorge has had no agency in shaping and producing this wonderful channel. Mightier forces have worn away the hard strata, more powerful torrents than any that now flow over the surface—set in motion probably when this portion of Virginia was shaken by those great convulsions which displaced its piles of strata to the depth of thousands of feet, bringing into juxtaposition, along the line of fissures which are still to be traced, groups of rock everywhere else found separated by other formations, the aggregate thickness of which might be measured by miles. The mineral springs so common in this region, and particularly along the lines of these disturbances, flow up from great depths, as is made evident by the high temperature of many of them. Across the top passes a public road, and being in the same plane with the neighboring country, one may cross it in a coach without being aware of the interesting pass. There are several forest trees of large dimensions growing near the edge of the creek directly under the arch, which do not nearly reach its lowest part. The most imposing view is from about 60 yards below the bridge, close to the edge of the creek; from that position the arch appears thinner, lighter, and loftier. A little above the bridge, on the western side of the creek, the wall of the rock is broken into buttress-like masses, which rise almost perpendicularly to a height of nearly 250 ft., terminating in separate pinnacles which overlook the bridge. On the abutments of the bridge there are many names carved in the rock of persons who have climbed as high as they dared on the face of the precipice. Highest of all for nearly three quarters of a century was that of George Washington, who when a youth ascended to a point never before reached, but which was subsequently surpassed in 1818 by James Piper, a student in Washington college, who actually climbed from the foot to the top of the rock. **II.** In Walker co., Alabama, is a natural bridge said to rival that of Virginia. It is in the sandstone called millstone grit, which underlies the coal formation. It spans about 120 ft., and its height is about 70 ft. A smaller bridge connects it with the bluff beyond. The lines of stratification of the sandstone give the structure the appearance of having been artificially built up with massive blocks. It is in the midst of a region of wild and romantic beauty, high escarpments of the same sandstone being seen standing out in the face of the hills around. There is a similar bridge

in Christian co., Kentucky, 180 ft. high, with a span of 70 ft. **III.** California has five natural bridges, the largest of which is on a small creek emptying into the Hay fork of the Trinity river, where a ledge of rock 3,000 ft. wide crosses the valley. Under this runs the creek, through an arch 20 ft. high by 80 ft. across. The rock above the arch is 150 ft. deep. On Lost river, in Siskiyou co., there are two natural bridges about 80 ft. apart. The rock is a conglomerate sandstone, and each bridge is from 10 to 15 ft. wide, while the distance across the stream is about 80 ft. One of these bridges is visited regularly by travellers. On Coyote creek, in Tuolumne co., 10 m. N. of Sonora, are two natural bridges, half a mile apart. The upper bridge is 285 ft. long with the course of the water, and 36 ft. high, with the rock 80 ft. deep over the water. The lower bridge is similar in size and height to the other.

BRIDGEND, a market town of Glamorgan-shire, Wales, 17 m. W. by N. of Cardiff, 190 m. from London by rail; pop. about 3,000. It is beautifully situated in a fertile district on the Ogmere, which divides it into two parts called Oldcastle and Newcastle, connected by two stone bridges. The Welsh name of the place is Pen-y-Bont-ar-Ogwr. Its general appearance is picturesque; the streets are irregular, and the houses mostly of stone and well built. The town is lighted with gas, and contains a new Gothic church and several other fine public buildings. Its chief support arises from its position as a market town placed between a mineral and an agricultural population. The river Ogmere is much resorted to for salmon fishing, and also for trout and a fish called the gwyniad, which is very abundant. About two miles from Bridgend are the extensive ruins of Cooty castle.

BRIDGENORTH, a parliamentary and municipal borough and town of Shropshire, England, on both sides of the Severn, 18 m. S. E. of Shrewsbury; pop. of the town and borough in 1871, 15,436, of whom 5,871 were in the town. It is said to be of Saxon origin, and was anciently called Brugia, Brug, or Bruges. The town consists of an upper and a lower part, connected by a handsome bridge of six arches. The upper town is built on a rock, on the summit of which stand an old castle and two churches. A free grammar school founded in 1503, a national school founded in 1847, a town hall of considerable antiquity, a public library, and a theatre are among the most notable buildings in the place. An extensive carrying trade is maintained on the Severn, and there are carpet manufactories and large mills for spinning worsted; tobacco pipes and nails are also manufactured.

BRIDGEPORT, a city and half shire town of Fairfield co., Conn., situated on Long Island sound, 59 m. N. E. of New York, by the New York and New Haven railroad. It is the most important station on the road, and a terminus

of the Housatonic and Naugatuck railroads. The mouth of the Pequonnock creek furnishes a harbor safe and capacious, but somewhat injured by a sand bar. Much coasting business is done here, and steamboats make daily passages to and from New York. Near the shore the land is level, but soon rises to an elevation of 100 ft., called Golden hill, commanding a beautiful view of the sound, and crowned with elegant residences. The city is well built, has a gas and a water company, and many of its streets are shaded with large elms. The immediate vicinity was settled in 1639, but the city (formerly called Newfield) is almost wholly the growth of the present century. The town, formerly a part of Stratford, was incorporated in 1821, and the city charter was obtained in 1886. The population of the city in 1850 was 6,080; in 1860, 13,299; and in 1870, 18,969; of the town in 1870, 19,835. The value of the taxable property of the town in 1871 was \$10,512,156, which amount was exceeded only by that of three other towns in the state, Hartford, New Haven, and Norwich. In 1871 there were in the town 13 schools, with 7 male teachers, 43 female teachers, 3,605 pupils registered in the public schools, and 498 in private schools. The city contains 5 national banks and three savings banks, with deposits aggregating, Jan. 1, 1871, \$4,473,102. Bridgeport is noted for its manufactures of firearms and sewing machines. Among the most extensive establishments are those of the Wheeler and Wilson and Howe sewing machine companies, the Union metallic cartridge company, the New Haven arms company, and one of the largest carriage manufactories in the United States. There are seven other carriage factories, several iron foundries, manufactories of locks, saddles, harness, carriage springs, and coach lace, and two daily newspapers.

BRIDGET, or *Bride, Saint*, patroness of Ireland, born at Fochard, county Armagh, about the end of the 5th or the beginning of the 6th century. She withdrew from the world in early youth, received the habit of a nun at the hands of St. Mel, nephew and disciple of St. Patrick, and built herself a cell under a large oak, calling it Kill-dara, or Kildare, the cell of the oak. She was soon followed by other virgins from the surrounding country, and in a short time found herself at the head of a flourishing order, which extended into different parts of Ireland, and even passed into England, Scotland, Germany, and France. It subsisted for many centuries, but is now extinct. Several biographies of this saint have been written, but they contain little more than a recital of her miracles. It is related that her body was discovered in 1185, at Down-Patrick, and was there kept until the destruction of its shrine by Henry VIII. The head is said to be still preserved in the Jesuits' church at Lisbon. Her feast falls on Feb. 1.

BRIDGET, Sisters of Saint, a religious order founded in 1806 by Dr. Delany, bishop of Kil-

dare and Leighlin, Ireland, and subsequently approved by the pope. The rule embraces the three vows of poverty, chastity, and obedience, and has special reference to the direction of parish schools. The habit is black, similar to that of the Presentation nuns and the Sisters of Mercy. The first convent of the order was opened at Tullow, county Carlow, and the second at Mount Rath, in 1808. One was established at Buffalo, N. Y., about 1853.

BRIDGETON, a city, port of entry, and the capital of Cumberland co., New Jersey, situated on both sides of Cohansey creek, 20 m. from its entrance into Delaware bay, 60 m. S. S. W. of Trenton, and 40 m. S. of Philadelphia, with which it is connected by the West Jersey railroad; pop. in 1870, 6,880. The city is divided into three wards, is neatly built, and its opposite parts are connected by a drawbridge across the creek. It contains 8 churches, a court house, a bank, two academies, a public library, and two newspaper offices, also an extensive iron foundery, a rolling mill, nail, glass, and woollen factories, besides other manufactories. Ship building forms an important industry; 13 vessels (12 sailing and 1 steam) of 389 tons were built here in 1870. The trade of the city employs a large number of schooners and sloops. In 1871 the total number of vessels registered, enrolled, and licensed here was 282, with an aggregate tonnage of 15,113 tons. The town of Cohansey was annexed to Bridgeton in 1868.

BRIDGETOWN, a city and the capital of Barbadoes, situated on Carlisle bay at the S. W. end of the island; pop. about 24,000. It is about 2 m. long and half a mile wide, and is the principal port of the island. Besides many fine houses surrounded with extensive grounds, it contains a handsome square, called Trafalgar square, in which a bronze statue of Lord Nelson was placed in 1813. There are also a cathedral, a Jewish synagogue, numerous churches and schools for blacks and whites, a handsome market place, the barracks, and several hospitals. The town contains some excellent literary and scientific societies and good libraries; a free public library was established in 1847. Bridgetown is the residence of the bishop of Barbadoes and of the governor general of the Windward Islands. The town was founded about the middle of the 17th century, but was almost entirely destroyed by fire in 1766. It also suffered severely from fire in 1845.

BRIDGEWATER (Indian name, *Nunketess*), a township of Plymouth co., Mass., on the Fall River and Bridgewater branch railroads, 27 m. S. E. of Boston, and 20 m. N. W. of Plymouth. It once formed part of Duxbury, was purchased of the Indians in 1645 by Capt. Miles Standish, and was incorporated as a separate precinct in 1716. In 1790 it contained 4,975 inhabitants; three new townships were afterward separated from it, and incorporated as East, North, and West Bridgewater.—**OLD BRIDGEWATER** is plea-

santly situated on Taunton river, embraces some of the best land in the county, and possesses considerable commercial importance; pop. in 1870, 3,660. It is the seat of a state normal school, with a library of 5,000 volumes; of an academy, incorporated in 1799; and of a state almshouse. There are 15 or 20 public schools, and Episcopal, Swedenborgian, and Congregational churches. The town contains 2 rolling and slitting mills, a forge manufacturing anchors, chain cables, &c., a brass foundery, a paper mill, 8 saw mills, 2 manufactories of hollow ware and castings, 2 of cotton gins, 1 of cotton, woollen, and other machinery, 1 of metal sheathing for vessels, and 2 of tin ware. A weekly newspaper is published here.—**EAST BRIDGEWATER** is about 25 m. S. E. of Boston, on Beaver and Sautucket rivers, branches of the Taunton; pop. in 1870, 3,017. It has important manufactures, some of which have been carried on since its first settlement, about 1688. Cannon were cast here during the revolution. The town contains 2 shoddy mills, 2 rolling and slitting mills, 2 forges manufacturing bar iron, 6 saw mills, 1 manufactory of cotton gins, and 2 of tacks and brads; 299 males and 97 females are engaged in the manufacture of boots and shoes. A weekly newspaper is published here. There are several churches and good schools.—**NORTH BRIDGEWATER** is about 20 m. S. E. of Boston, on the Fall River railroad, and is watered by the Salisbury river; pop. in 1870, 3,007. It has a good soil, adapted to grazing, and contains Congregational, Swedenborgian, Baptist, and Methodist churches, a weekly newspaper, and good schools; 1,059 males and 208 females are employed in the manufacture of boots and shoes. There are also manufactories of mechanics' tools, tacks, brads, lasts, shoe pegs, blacking, musical instruments, tin ware, &c.—**WEST BRIDGEWATER** is about 25 m. S. E. of Boston, on the Fall River railroad; pop. in 1870, 1,803. A branch of the Taunton river flows through it, affording motive power to several mills and factories. There are 4 saw mills, 3 manufactories of hollow ware and castings, and 1 of soap; and 144 hands employed in the manufacture of boots and shoes. There are churches of various denominations and several schools.

BRIDGEWATER, a seaport, parliamentary borough, and parish of Somersetshire, England, on the river Parret, the Bristol and Exeter railway, and the Taunton and Bridgewater canal, 29 m. S. W. of Bristol; pop. in 1871, 12,101. It is a place of much antiquity, mentioned in "Domesday Book" by the name of Brugie. The Parret admits vessels of 200 tons, and opens on the Bristol channel. The foreign trade is principally with the United States, Canada, the West Indies, and Russia. About 3,500 tons of shipping belong to the port. Brick and tile making is carried on in the neighborhood, the making of white brick, known as Bath brick, constituting a staple trade of the town. The parish church is a fine structure. There

are places of worship for Unitarians, Quakers, Independents, Methodists, and Baptists; also various schools and charitable institutions. In the neighborhood is the isle of Athelney, in which Alfred took refuge from the Danes. At the conquest many Saxons were settled here. It was a place of importance in the various civil wars of England, and attained a celebrity from the part taken by its inhabitants in the Monmouth rising, and the retaliation therefor.

BRIDGEWATER, Francis Egerton, second and last duke of, an English nobleman, born in 1736, died March 8, 1803. He is chiefly known for having opened the first navigable canal in England, from his coal mines of Worsley to Manchester, which was subsequently extended to connect the Trent and Mersey. This canal, which was wholly constructed by the duke, not only largely increased his revenue from the mines, but reduced the price of coal at Manchester 50 per cent. (See BRINDLEY, JAMES.)

BRIDGEWATER, Francis Henry Egerton, earl of, born Nov. 11, 1758, died in Paris, Feb. 11, 1829. He was the second cousin of the preceding, and the youngest son of John Egerton, bishop of Durham, grandson of John, 8d earl of Bridgewater, whose direct ancestor was Sir Thomas Egerton, lord chancellor of England. (See EGERTON.) He graduated at Oxford in 1780, in which year his father appointed him a prebendary of Durham. His relative, the last duke of Bridgewater, presented him to valuable rectories in Shropshire in 1781 and 1797. His brother John succeeded to the earldom on the extinction of the dukedom of Bridgewater in 1803. Twenty years later Mr. Egerton himself became the eighth and last earl, dying a bachelor. He resided during the latter part of his life in Paris, where he was distinguished for his eccentricities. His house was nearly filled with cats and dogs; out of fifteen dogs, two were admitted to his table, and six, dressed up like himself, were frequently seen alone in his carriage, drawn by four horses and attended by two footmen. His own publications are a splendid edition of the "Hippolytus" of Euripides, with scholia, notes, various readings, and a Latin version; a "Life of Lord Chancellor Egerton;" a "Letter to the Parisians on Inland Navigation;" and "Anecdotes" of his own family. He bequeathed his manuscripts and autograph letters to the British museum, with £12,000, the interest of which was to be expended in taking care of and increasing them. Further, by his will, dated Feb. 25, 1825, he left £8,000 to the president of the royal society, to be given to some person or persons named by him, who should write, print, and publish 1,000 copies of a work "on the power, wisdom, and goodness of God, as manifested in the creation." Mr. Davies Gilbert, who occupied the chair of the royal society when the earl died, decided that eight treatises, devoted to the illustration of separate branches of the subject, should be written. Thus originated the "Bridgewater Treatises,"

whose authors were Thomas Chalmers, D. D., John Kidd, M. D., William Whewell, D. D., Sir Charles Bell, Peter Mark Roget, M. D., William Buckland, D. D., the Rev. William Kirby, and William Prout, M. D. These works have had a large and continuous sale; and, by the terms of the bequest, the profits of the treatises are appropriated to their respective authors. The earl's immense property, about £100,000 a year, in the first instance, came into possession of his kinsman, the duke of Sutherland. On his death in 1833, it devolved upon the duke's second son, Lord Francis Leveson Gower, who then took the name and arms of Egerton only, and was created Viscount Brackley and earl of Ellesmere in 1846.

BRIDGMAN, Laura, a blind deaf mute, born at Hanover, N. H., Dec. 21, 1829. • Up to the age of two years she possessed all her faculties but a severe illness at that time occasioned the loss of sight and hearing, and consequently of speech, while the sense of smell was also destroyed, and that of taste greatly impaired. She recovered her health gradually, but none of her lost senses were restored. At the age of eight she became an inmate of the Perkins institution for the blind in Boston, under the care of Dr. S. G. Howe, and soon acquired such a familiarity with the building and its various apartments that she could wander at will through it unattended. Dr. Howe resolved to undertake the task of instructing her, a work which until that time had never been attempted with success. The first step was to teach her the names of objects; for this purpose an object with which she was familiar, such as a fork or spoon, was put into her hand, and with its name in raised letters. This was repeated many times and with different objects, till she had learned that the word bore some relation to the object. As yet, however, her idea of this relation was very vague. The next step was to present her the separate letters in relief, at first so arranged as to form the name of an object which she knew. Finding that she recognized the word, her teacher disarranged the letters, and taking her hands in his own proceeded to reconstruct the word, causing her to observe each letter which composed it; having done this several times, she constructed the word herself without assistance. The same process was then repeated with other words, and before the close of her lesson the idea had evidently dawned upon her mind that this was a means by which she could communicate her own thoughts to others. This process was continued until she had become familiar with a considerable number of words. She was then furnished with type having the letters in relief, and a board which had been pierced with holes for the reception of the type. Objects known to her were then presented, and she would compose the names with the type. This afforded her great delight. She was next taught the manual alphabet, which she acquired very

readily. This having been attained, her teacher presented her with an object with which she was not familiar, and left her for a time to inform herself concerning its form and use. The teacher then spelled its name with the manual alphabet, the child following each letter till she had comprehended that it was the name of the object, when she herself spelled it in the same way, then composed it with her types, and finally, as if to make assurance doubly sure, placed the word thus composed by the side of the object. All this was accomplished in the first three months. The same course, together with some lessons on the physical relations of objects, was continued through the year. Laura never wearied of this instruction, but when left to herself was constantly spelling words either with her type or the manual alphabet. Her instruction was confined for the first two years to the names of objects; the attempt was then made to instruct her in their qualities, and subsequently in their relations to each other. There were many difficulties connected with each step, but patience and perseverance overcame them all. She was next taught to write, and her first effort was to write a letter unassisted to her mother. She subsequently acquired the rudiments of arithmetic; took lessons on the piano, on which she became a skilful performer; and acquired a practical knowledge of needlework, and of some household duties. The ideas she acquired were constantly the subjects of thought and inquiry. She one day addressed to Dr. Howe this question: "Man has made houses and vessels, but who made the land and the sea?" The answer that it was God who made all things, and the explanation of his character, affected her deeply. She sought to know more of this wonderful being, and did not rest satisfied till her teachers had explained to her the great truths of revelation. The fear of death, which had formerly distressed her, passed away with the entrance of the hope of a resurrection. In deportment she is modest almost to diffidence. She possesses a decided love of system and neatness, never leaving her room in disorder, and exhibiting great solicitude for propriety and taste in the arrangement of her dress. She exhibits a marked regard for the rights of others, and is at the same time jealously mindful of her own. She is now (1878) in her 44th year, and makes her home most of the time at the Perkins institution. Dr. Howe writes: "She enjoys life quite as much, probably more, than most persons do. She reads whatever books she finds in raised point, but especially the Bible. She makes much of her own clothing, and can run a sewing machine. She seems happiest when she can find some person who knows the finger alphabet and can sit and gossip with her about acquaintances, the news, and general matters. Her moral sense is well developed."

BRIDLINGTON (formerly written **BEELLINGTON**, and usually called **BURLINGTON**), a parish

of the East Riding of Yorkshire, England, on the railway from Hull to Scarborough, on the North sea, 6 m. W. S. W. of Flamborough Head and 25 m. N. N. E. of Hull. It includes the market towns of Bridlington and Bridlington Quay; pop. in 1871, 9,662. The town of Bridlington is built chiefly along one narrow street, and contains the remains of a priory built in the 18th or 14th century, and now used for the parochial church. There are also places of worship for several dissenting sects, three or four schools, and manufactories of hats. It gives the title of earl to the Cavendish family.—Bridlington Quay is situated on a fine bay about a mile from Bridlington, and is much resorted to in summer for bathing. There is here a chalybeate spring. The town has a good harbor, formed of two handsome piers, and an active export trade in corn. Paul Jones captured here the convoy of the Baltic fleet, Sept. 21, 1779.

BRIDPORT, a seaport town and municipal and parliamentary borough of Dorsetshire, England, 127 m. S. W. of London; pop. in 1871, 7,666. It is an ancient town, consisting mainly of three spacious streets. The fine old parish church of St. Mary was restored in 1865; among other places of worship is a handsome Congregational church. The town hall, completed in 1860, is a good building. There is a literary and scientific institution, and a school of art. The coasting trade, which was formerly considerable, was diminished by the railways; but it has recently increased owing to the improvement of the harbor, which is $1\frac{1}{2}$ m. from the town, at the mouth of the Brit, and can accommodate vessels of 200 tons. Ship building is carried on to some extent; there are two weekly markets and two annual fairs for cattle, sheep, cheese, and small wares. Bridport was a borough during the Saxon period, and under Henry VIII. enjoyed the monopoly of supplying the navy with cordage. The name "Bridport dagger" was formerly applied to the halter.

BRIE (anc. *Brigensis pagus* or *saltus*), a former district of France, lying between the Seine and the Marne, and now contained in the departments of Aisne, Seine-et-Marne, Marne, and Seine-et-Oise. It was divided into Brie Française, which belonged to the government of Île de France, and Brie Champenoise, comprised in the government of Champagne. A third division once existed, called Brie Ponilleuse, comprising the environs of Château-Thierry; this was afterward incorporated with Brie Champenoise. The latter was the largest of the divisions, and had for its capital Meaux, the most important town in the whole district. Its chief wealth was in vineyards and pastures; and its butter and cheese are celebrated. Brie Française produced grain in great abundance, and was likewise a good grazing country. Its capital was Brie-Comte-Robert. Corbeil, one of its principal towns, was an independent earldom from 946 to 1122, when it was taken from

Count Hugues du Puiset by Louis the Fat. In ancient times this district was partly covered by a vast forest, portions of which are still to be seen. It is believed by some to be the much disputed country of the Meldi, of whom Cæsar makes mention. It was subjugated by the Franks, and formed part of the kingdom of Neustria. In the 9th century it was ruled by its own counts, who took their title from Meaux, but are also styled counts of Brie. Herbert of Vermandois, one of these feudal lords, having obtained the county of Troyes or Champagne, in 968 united the two districts. Both passed to the crown in 1361.

BRIEF (Lat. *brevis*, *breve*; Fr. *brief*, short). I. A writ issuing out of any court in the name of the king; though more strictly the name of the original writ by which a suit was commenced, it was afterward applied to all judicial writs. The reason of the name, as explained by Bracton (which, however, was only in reference to the original writ), was that it briefly set forth the subject matter of the action and the claim of the plaintiff. II. In ecclesiastical law, a pontifical letter addressed to inferior ecclesiastics or to temporal princes upon some matter of discipline or claim of the church, called an apostolical brief. This designation may have been used as expressing the concise form of the brief as compared with the more ample phraseology of the pope's bull. A similar use of the term was made in respect to a letter from the king in reference to ecclesiastical matters. III. In modern law, a summary of a case made out for the use of counsel, containing an abstract of the pleadings, a statement of the facts that can be proved, and a list of witnesses with a specification of what each can testify to. In England this is prepared by the attorney. In this country counsel often make up their own brief, and the word generally denotes the heads of a law argument, with citations of authorities, which are not only used for the convenience of counsel, but are furnished to the court.

BRIEG, a town of Prussian Silesia, on the left bank of the Oder, and on the railway from Breslau to Vienna, 28 m. S. E. of Breslau; pop. in 1871, 15,367. It contains a castle, the residence of the old counts of Brieg, several churches, a synagogue, a lunatic asylum, a gymnasium, and an arsenal. Its fortifications were destroyed by the French in 1807. Its principal trade is in cloths, tobacco, and starch,

and its cattle fairs are the most important in the province. There are extensive manufactures of linens, woollens, and cottons.

BRIEL, **Brill**, or **Brielle** (properly **BREDE HILL**), a fortified seaport town of Holland, province of South Holland, on the left bank and near the mouth of the Maas, on the N. coast of the Voorne island, 14 m. W. of Rotterdam; pop. about 7,000. The principal church is that of St. Catharine's, and among other public buildings are a synagogue, a Latin school, an ancient orphan asylum, and an arsenal. There are several manufactories, and the principal trade is in cereals and madder. About 5 m. above the town is the entrance to the new Voorden canal across the Voorne island, by which large ships pass from the Maas to Hellevoetsluis. Admiral Marten van Tromp and Vice Admiral Van Almonde were natives of Briel. The first victory of the Dutch patriots over Spain was achieved here, April 1, 1572.

BRIENNE, or **Brienne-le-Château**, a town of France, in the department of Aube, 14 m. N. W. of Bar-sur-Aube; pop. in 1866, 2,078. It takes its name from a magnificent château erected in the 18th century by Louis de Loménie, the last count of Brienne. The military college of Brienne, founded in 1770, was attended by Napoleon from 1779 to 1784. It was suppressed in 1790, and the buildings no longer exist. On Jan. 29, 1814, Napoleon attempted here the manoeuvre of cutting the Silesian army in two, by marching suddenly from Châlons, and inter-



Military School of Brienne.

posing his forces between Schwarzenberg and Blücher, so as to prevent their junction. A severe contest ensued, with advantage to the French, but without important results. By his will Napoleon left 1,000,000 francs to the town and 200,000 to the inhabitants.

BRIENZ, **Lake of**, in the S. E. part of the canton of Bern, Switzerland, formed by the expansion of the river Aar, and connected with

the lake of Thun. It is about 8 m. long and 2 m. broad, and is embosomed in mountains, some of which, on the south, project in high promontories into the lake. Cascades from these mountains are abundant, the principal of which is the Giessbach. The surface of the lake is about 1,700 ft. above the sea. In the river Aar, E. of the lake, are the falls of Reichenbach and Alpbach, the former celebrated for its cascade of 2,000 ft., and the latter for its triple iris in the morning. The village of Brienz is at the N. E. end of the lake, near the entrance of the Aar; pop. in 1868, 4,168.

BRIER CREEK, a small stream rising in Warren co., Ga.; flowing S. E. for about 100 m., and entering the Savannah river a few miles E. of Jacksonborough. After the American victory on Kettle creek, in February, 1779, Gen. Ashe was sent at the head of about 1,200 continental troops to drive the British from Augusta. The latter, under the command of Gen. Campbell, evacuated the city, retreated to Brier creek, and after crossing destroyed the bridge. Ashe pursued them, arrived at the creek Feb. 27, and while halting to form a camp, March 3, was surprised by 1,800 British under Gen. Prevost, who crossed the stream 15 m. above, made a wide circuit, attacked his rear, and routed him with a loss of about 150 killed and 189 prisoners, besides all the baggage, 7 pieces of cannon, about 500 stand of arms, and much ammunition. The British had only 5 killed and 11 wounded, and were enabled by this victory to reoccupy Augusta and open a free communication with the Indians and Tories in Florida, western Georgia, and the Carolinas.

BRIES (Hun. *Brenó-Bánya*), a town of Hungary, in the county of Zólyom, on the Gran, 24 m. N. E. of Neusohl; pop. in 1870, 11,776, nearly all Slovaks. The inhabitants are chiefly engaged in agriculture and cattle breeding. The cheese of Bries is famous.

BRIGGS, Charles Frederick, an American author and journalist, born on the island of Nantucket about 1810. Early in life he removed to the city of New York, where he edited several periodicals, and became a constant contributor to others. In 1839 he published a novel entitled "The Adventures of Harry Franco, a Tale of the great Panic." Four years later his "Haunted Merchant" appeared, and in 1847 "The Trippings of Tom Pepper, or the Results of Romancing." In 1844 he commenced the "Broadway Journal," of which in the following year Edgar A. Poe became his associate editor. He was an editor of "Putnam's Magazine" from 1853 to 1856, in connection with George William Curtis and Parke Godwin, and also of the new series of the magazine in 1869. He was for some years one of the editors of the "New York Times," and is now (1873) one of the editors of the "Brooklyn Union."

BRIGGS, Henry Perreot, an English painter, born in 1793, died in London in January, 1844. He first exhibited portraits in the royal acad-

emy in 1814, and in 1818 appeared as a historical painter. His best known works are "Othello relating his Adventures to Desdemona," and the "First Interview between the Spaniards and Peruvians."

BRIGHAM, Amariah, an American physician, born at New Marlborough, Berkshire co., Mass., Dec. 26, 1798, died at Utica, N. Y., Sept. 8, 1849. He commenced the practice of medicine in 1821, resided successively in Enfield and Greenfield, Mass., and in Hartford, Conn., and spent a year in European travel and study. In 1837 he delivered a course of lectures before the college of physicians and surgeons at New York. In 1840 he was appointed superintendent of the retreat for the insane at Hartford, and in 1842 of the New York state lunatic asylum at Utica. Here he had the personal care and supervision of 450 or 500 patients, besides which he delivered popular lectures on the treatment of the insane, and established a "Journal of Insanity." He published in 1832 a small work on "Asiatic Cholera," and soon afterward a treatise on "Mental Cultivation and Excitement;" in 1836, "The Influence of Religion upon the Health and Physical Welfare of Mankind;" in 1840, "The Anatomy, Physiology, and Pathology of the Brain;" and in 1849, a small volume of aphorisms and maxims for the use of those who had been under his care, under the title of the "Asylum Souvenir."

BRIGHAMIA (Gray), a curious genus of plants, of the family *lobeliaceae*, discovered in the Hawaiian Islands, and named for William T. Brigham of Boston, Mass. In *B. insignis* the co-



Brighamia.

rolla is showy, white with a tinge of cream color; the long slender tube (4 inches) slightly incurved; lobes 5, about 1 inch long, vulvate in aestivation; stamens united in a column around the pistil and adnate to the lower half of the calyx tube; stigma 2-lobed, naked; ovary 2-celled; leaves obovate, about 6 or 8

inches long, clustered in a head at the summit of the column or stem. The flowers, which are abundant and last for several months, are sweet-scented. The plant has been cultivated in England, and makes a very ornamental appearance in conservatories. The juice is not milky as in most of the arborescent *lobeliaceae*, and is reputed a remedy for skin diseases applied externally.

BRIGHT, Jesse D., an American senator, born at Norwich, Chenango co., N. Y., Dec. 18, 1812. He settled in Indiana, where he practised law, and held several offices, among which were those of state senator and lieutenant governor. He was chosen United States senator in 1845, and reelected for two successive terms. He was a strong adherent of the democratic party. Early in 1862 he was charged with disloyalty, the principal evidence being that on the 1st of March, 1861, after the organization of the confederate government, he wrote a letter addressed to "Jefferson Davis, president of the Confederate States," recommending to him a person who was desirous of furnishing arms. For this he was, by a vote of 32 to 14, expelled the senate, Feb. 2, 1862. He afterward settled in Kentucky.

BRIGHT, John, an English statesman, born at Greenbank, near Rochdale, Lancashire, Nov. 16, 1811. He is a member of the society of Friends, and head of a firm of cotton spinners and manufacturers in Rochdale. When the anti-corn-law association was formed in 1838, he entered heartily into its plans, coöperating with Mr. Cobden, and the two became the leading spirits in the league. In 1843 he was chosen member of parliament for Durham, took an active part in the measures for free trade, and had much to do with the bill of 1846 for the immediate modification of the corn laws, and their total repeal at the end of three years, or on Feb. 1, 1849. In 1847, and again in 1852, he was returned to parliament from Manchester. In 1854 he sanctioned the sending a deputation of Friends to dissuade the czar from entering upon hostilities with Turkey, and also deprecated the policy of England in taking part in the war. In 1857 his opposition to the war with China rendered him unpopular with his constituents, and he was defeated in Manchester by a large majority. He was, however, returned for Birmingham, and vigorously urged the passage of a vote of censure against the Palmerston administration for introducing the foreign conspiracy bill, in consequence of which the ministry resigned, Feb. 20, 1858. Shortly afterward he made a speech in favor of the reduction of the British military establishment, and condemning the policy of Asiatic conquest. In 1860 he took a leading part in bringing about the commercial treaty with France. During the American civil war he was a firm friend of the Union, and supported its cause both in and out of parliament. In 1865 he entered upon the agitation in favor of the extension of the elec-

tive franchise, which finally resulted in the passage of the reform bill of Aug. 15, 1867. He also urged the necessity of reform in Ireland, and the disestablishment of the Irish church, a bill for which was introduced into the house of commons March 1, and passed July 26, 1869. At the parliamentary election of 1868 a large majority of liberals were returned; the Disraeli administration resigned Dec. 2, and in the Gladstone ministry which succeeded it Mr. Bright became president of the board of trade, being the first Quaker who ever held a seat in the British cabinet. In consequence of the failure of his health, he resigned his seat in the cabinet Dec. 20, 1870. In 1872, having partially recovered, he resumed his place in parliament, but has not since been able to take any prominent part in public business. Mr. Bright's eloquence, energy, probity, and uniform adherence to principle, have placed him at the head of the liberal party in England. A collection of his "Speeches on Questions of Public Interest" has been published (2 vols., London, 1868).

BRIGHT, Richard, an English physician, born at Bristol in 1789, died Dec. 15, 1858. He took his medical degree at the university of Edinburgh in 1812, and afterward settled in London, where he practised with great success, and became licentiate of the royal college of physicians, and physician to Guy's hospital. He sought especially to trace the connection between morbid symptoms and alterations in the structure of the internal organs; and in this way he discovered that the dropsical effusion and albuminous condition of the urine, present in the disease which bears his name, were dependent on a peculiar degeneration of the substance of the kidney. He wrote on morbid anatomy, on diseases of the brain, on abdominal tumors, and other similar subjects. His publications illustrating disease of the kidney appeared in 1836, 1839, and 1840.

BRIGHTON, a town of Middlesex co., Mass., on the Boston and Albany railroad, 4 m. W. of Boston; pop. in 1870, 4,957. It contains the principal cattle market of New England. There are 34 slaughter houses, employing 122 hands, and slaughtering annually 25,088 cattle, 170,517 swine, 23,781 sheep, and 1,200 calves. It also contains a planing mill, and manufactories of cordage, candles, oil, varnish, neatsfoot oil, bone, and glue stock.

BRIGHTON (formerly BRIGHTHELMSTONE), a watering place and parliamentary borough of England, in the county of Sussex, on the English channel, 51 m. S. of London by the London, Brighton, and South Coast railway; pop. in 1871, 90,013. It extends for more than 10 m. along the coast from Kempton on the east to Hove on the west. The eastern half of the town stands on the ridge of high chalk cliffs which stretch away to Beachy Head; the western half is seated on a low pebbly beach and is sheltered by Selsea Bill. The foundation of its prosperity was chiefly laid in the

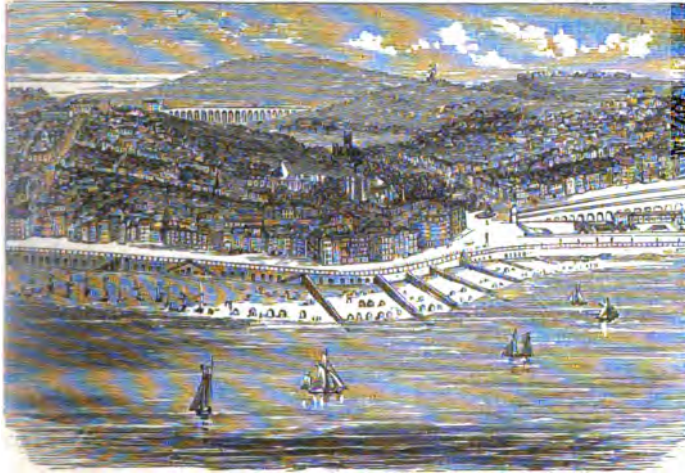
middle of the 18th century, by Dr. Richard Russell, whose work on the use of sea water attracted much public attention. Its celebrity as a fashionable watering place was due to the prince of Wales, afterward George IV., who made it his place of residence, and commenced in 1784 the erection of the pavilion, which was completed three years afterward. The town subsequently purchased it from the crown for the sum of £53,000, and threw it and the pleasure grounds attached to it open to the public. The chain pier was erected by a joint stock company in 1822-'3, at an expense of £30,000. It is 1,134 ft. long, and extends into the sea 1,014 ft. Another pier 1,115 ft. long was completed in 1867. The east side of Brighton is protected by a sea wall 60 ft. high and 23 ft. thick at the base. In the western quarter is a battery, consisting of six 42-pounders, erected in 1793. On the eastern side is the Queen's park, and on the western a chalybeate

There are 5 banks and 6 newspapers in the town. The coasting and foreign trade is transacted at Shoreham, 7 m. W. There are about 100 fishing boats, manned by 500 men. Mackerel, herrings, soles, brill, and turbot most abound; mullet and whiting are also met with. Brighthelmstone is mentioned in "Domesday Book." It has frequently suffered from hostile invasion. The French plundered and burnt it in 1513. During the reigns of Henry VIII. and Elizabeth fortifications were erected to protect it. In the 17th century it contained 600 families, mostly engaged in fishing.

BRIGIDA, Bridget, or Brigit, Saint, born in Sweden in 1802, died in Rome, July 23, 1878. She is thought to have been the daughter of Birger, prince of the royal blood of Sweden, and of Ingeburgis, a descendant of the Gothic kings. At the age of 16 she was given in marriage to the councillor Ulpho or Ulf Gudmarson, by whom she had eight children, the youngest of

whom is honored in the Roman calendar by the name of St. Catharine of Sweden. After the birth of these children the parents took a vow of continence, built a charity hospital which they served in person, and made a pilgrimage to Santiago de Compostella, on returning from which Ulpho resolved to enter the Cistercian monastery of Alvastre. He died in 1344. Brigida now divided the estate among her children, and built a large monastery at Wadstena, in which she placed 25 monks and 60 nuns, prescribing for them the rule of St.

Augustine. Here she spent two years in close seclusion, and then set out for Rome. After founding in that city an asylum for pilgrims and Swedish students, she went to Jerusalem, visited the holy places, and then returned to Rome. She was canonized by Boniface IX. in 1391, and Oct. 8 was appointed as her festival. In the church of Rome St. Brigida is best known by her revelations, chiefly concerning the passion of Jesus Christ, and events which were to happen in certain kingdoms. They were written after her narration partly by her confessor Peter, a Swedish Cistercian monk, partly by a Spaniard called Alfonso the hermit. Gerson attacked them with great severity; but the council of Basel gave them its approbation after they had been thoroughly examined by John de Turrecremata. Among her other works are a discourse in praise of the blessed Virgin, and a series of prayers on the sufferings and love of Christ.



Brighton.

spring. There are 25 churches and chapels belonging to the established church, and 30 other places of worship. Its institutions of learning are numerous. The Brighton college, founded in 1847 for the sons of the middle classes, has a more modern course of studies than the other great English schools. The benevolent institutions of Brighton are almost as numerous as its schools. Foremost stands the Sussex county hospital, established in 1828, and since thrice enlarged. The town hall is a large building. Fairs are held near the town on Holy Thursday and Sept. 4. There are a theatre, an assembly room, and two club houses. The literary societies are the royal Brighton scientific and literary institution, the Brighton Athenæum, and the Brighton workmen's institute. A great marine aquarium was opened in August, 1872. There is every species of bathing establishments, and a good supply of fresh water and gas. The only manufacture is that of wooden wares.

BRIGITTINS, or *Order of our Saviour*, a branch of the Augustinians, founded about the year 1344 by St. Brigida of Sweden, and approved by Urban V. in 1370. It owes its origin to the monastery built by Brigida at Wadstena, near Linköping, in Sweden. It embraces both monks and nuns, who occupy contiguous buildings, and celebrate the divine office in the same church, but never see each other. The prioress is superior in temporal concerns, but spiritual matters are managed by the monks. All the houses of the order are subject to the bishop of the diocese, and no new one can be founded without express permission of the pope. The number of monks in each monastery was fixed by the rule at 25, that of nuns at 60; but this regulation was not always strictly enforced. Denmark, Norway, the Netherlands, Germany, Portugal, and several other countries had convents of this order, most of which, including the parent house at Wadstena, were destroyed at the reformation. The only house of the order in England was the rich institution known as Sion house, founded by Henry V. on the Thames, 10 m. from London. It was suppressed by Henry VIII., restored by Queen Mary, and again dissolved under Elizabeth. The monks of this order are now extinct, but a few convents for nuns existed in 1860 in Bavaria, Poland, Holland, and England.

BRIGNOLES, a town of Provence, France, in the department of Var, on the Calami, 21 m. N. N. E. of Toulon; pop. in 1866, 5,945. It is well built, and contains several squares planted and adorned with fountains, a public library, a normal school, an ecclesiastical school, and manufactories of silk, cloth, hardware, soaps, and of other articles. A good trade is carried on in wines, olive oil, liqueurs, and dried fruits; the prunes of Brignoles, produced in the country around Digne, enjoy a high reputation.

BRIHUEGA, a town of New Castile, Spain, in the province and 19 m. N. E. of the city of Guadalajara, on the Tajüña; pop. about 4,500. It was the scene of a decisive victory gained by the French, under the duke de Vendôme, over the allied forces, under Lord Stanhope, in 1710. A branch establishment of the royal cloth manufactory of Guadalajara occupies a splendid edifice built under the reigns of Ferdinand VI. and Charles III. A considerable trade in cloth and woollen goods is carried on.

BRIL, Paul, a Flemish painter, born at Antwerp in 1556, died in Rome in 1626. He aided his brother Matthew in decorating the Vatican, and executed some important works for the Sistine chapel. Some of his landscapes contain figures by Annibale Carracci. His finest composition is a landscape in the Vatican.

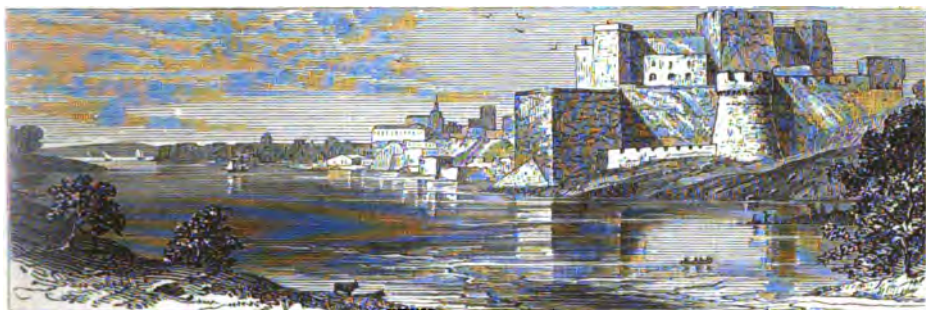
BRILLAT-SAVARIN, Anthelme, a French author and magistrate, born at Bellay, April 1, 1755, died in Paris, Feb. 2, 1826. He was a deputy to the states general in 1789, a judge of the court of cassation in 1792, and mayor of Bellay in 1793, in which year he fled to Switzerland and the United States to escape from the revo-

lutionary tribunal, and resided nearly three years in New York, where he supported himself by teaching French and by performing the orchestra of a theatre. He returned to France in 1796, and during the consulate again became a judge of the court of cassation, which position he held till his death. He is known to literature by his anonymous writings on political economy, and on the archæology of the department of Ain, also by a work on duels, but chiefly by his famous book on gastronomy, entitled *Physiologie du goût*, published in 1825, which has been translated into English and several other languages.

BRINDISI (anc. *Brundisium* or *Brundisium*) a seaport of Italy, on the N. E. coast of the province of Terra d'Otranto, lying at the head of a deep and sheltered harbor of the Adriatic, between the promontories Permo and Cavallotti, in lat. 40° 38' N., lon. 18° E., 44 m. E. N. E. of Taranto; pop. about 12,000. The town has comparatively few objects of interest, its castle called Forte di Terra, being the most noteworthy building of the place. This is a strong and well placed fortress, with immense round towers, and is the most conspicuous object in every view of the city. The cathedral, a large Norman structure, has little architectural beauty, and its walls have been much injured by earthquakes. Near it stands an ancient marble column about 50 ft. high, probably one of a portion of a temple. The Appian way terminates at Brindisi. There is a public library in the town, and a valuable collection of ancient coins. Improvements are going on in the harbor, which has greatly deteriorated in value since the Roman times, in part on account of dikes erected by Cæsar and intended to add to the safety of the port; instead of doing so they aided the accumulation of sand, and narrowed the entrance, to the great detriment of the inner bay. It is expected that the measures now in progress will restore the ancient value of the roadstead, secure a great depth of water along the piers, and materially advance the prosperity of the town. The importance and prosperity of Brindisi have of late years been greatly increased by the completion of the railway extending along the eastern coast from northern Italy. Thus connected with all the railways of the continent it has been selected as the place of embarkation for the mails to the East. Steamers carrying these mails and passengers ply between Brindisi and Alexandria, connecting with the regular mail steamers of the Peninsular and Oriental steamship company. Letters for India and all the East can thus be posted at London some days after the departure of the company's vessels from England, and still overtake them at Alexandria.—According to ancient tradition, Brundisium was founded by Cretans in a very remote time. It flourished as an independent city, governed for some time by princes of its own people. In 267 B. C. it was taken by the Romans. I

now gained the greatest importance as a commercial city, and its excellent harbor, near the narrow extremity of the Adriatic, caused it to be selected for the principal Roman naval station. Hannibal made an unsuccessful attempt to capture it. The chief fleets sent out for eastern conquest set sail from its harbor. Sulla landed at Brundisium when he returned in 83 B. C. from the Mithridatic war, and accorded the city many privileges for its kind

reception of him. Cæsar unsuccessfully endeavored to blockade Pompey and a part of his fleet in the bay before the city. Brundisium was again besieged by Antony in 40 B. C., but his reconciliation with Octavius prevented his pushing the siege to its end. Cicero landed here when he returned from exile in 57 B. C.; Horace visited the city in company with Mæcenas and Cocceius; Virgil died there in 19 B. C. After the fall of the Roman empire,



Castle of Brindisi.

Brindisi, after being at different times under the dominion of Goths, Saracens, and Greeks, fell into the hands of the Normans, and under their rule formed an important port of embarkation for the crusaders; but it soon lost its commercial prosperity. Louis of Hungary and Louis of Anjou each sacked the town in the 14th century, and in the 15th it was nearly destroyed by an earthquake. Frederick II. began the castle, and Charles V. completed it; but Brindisi even in his time had lost its prominence as a point either of attack or defence; and until the present century it remained an entirely insignificant seaport.

BRINDLEY, James, an English mechanic and engineer, born in Derbyshire in 1716, died at Turnhurst, Sept. 27, 1772. He was apprenticed to a millwright at the age of 17. After entering upon business he devised in 1752 an improved water engine for draining the coal mines at Clifton. In 1755 he built the machinery for a silk mill at Congleton. His reputation recommended him to the duke of Bridgewater, who employed him to construct a canal from his estate at Worsley across the river Irwell to Manchester; in 1761 he completed this watercourse, the first of the kind in England; it had no locks, and was in some parts a subterranean tunnel and in others an elevated aqueduct. He revived the idea of canal communication across the country by uniting the rivers Mersey and Trent, and tunnelled the Harecastle hill, which had before been deemed an insurmountable obstacle. This tunnel is 2,280 yards in length, and 70 yards below the surface. It was begun in 1766, and finished after Brindley's death by his brother-in-law, Mr. Henshall, in 1777. He superintended the construction of the Coventry and Oxford canals, by means of which, together with the Mersey

and Trent canal, he connected the Thames, Humber, Severn, and Mersey. His education was very meagre. It was his custom when perplexed with any extraordinary difficulty to retire to bed, and lie there sometimes for two or three days till his plan was clear.

BRINE, the salt water naturally produced in many parts of the world beneath the surface of the earth, which is more or less saturated with chloride of sodium or common salt, and which flows out in springs or is pumped up for the use of the salt manufactories.—Brine is also the artificial saline solution used for preserving meats. By a paper communicated to the imperial academy of medicine of France, it appears that brine thus used acquires poisonous properties in a few months, so that its use with food continued for some time may produce fatal effects. The symptoms are first noticed in the effect of the poison upon the nervous system. Tremblings, convulsions, and loss of sensation are caused. The secretions of the skin and kidneys are also increased, and violent congestion and inflammation of the intestines ensue. The council of health in Paris, after examining into this subject, recommend that "in all cases brine preserved too long, or in contact with rancid meat, should not be employed, except with the greatest care, and after it has been purified by skimming all the scum which forms on the surface." The salt pickle can be removed from brine by a process termed *dialysis*, and the juice then has the property of fresh soup. It is proposed in this way to make use of the extract of meat contained in all brines which have not been in contact with rancid meat.

BRINKMANN, Karl Gustaf, a Swedish diplomatist and poet, born Feb. 24, 1764, died in Stockholm, Jan. 10, 1848. He studied in Ger-

many, and was in the diplomatic service from 1792 to 1810. The university of Upsal, to which he presented his library, made him doctor, and he was also made a baron and a member of the academy. His first poems were published in Leipsic (2 vols., 1789), under the name of Selmar; his *Philosophische Ansichten und Gedichte* appeared anonymously in Berlin (1801); and his poem *Die Welt des Genius* (1821) received the first prize of the academy. He was erroneously regarded as the author of K. L. von Woltmann's anonymous *Memoiren des Freiherrn von S—a* (3 vols., Prague, 1815).

BRINVILLIERS, Marie Marguerite d'Aubray, marchioness de, a French woman, convicted of poisoning her father, her brothers, and many others, executed at Paris, July 16, 1676. She was highly educated, and moved in the best French society. Her father was Dreux d'Aubray, a prominent public officer of Paris. In 1651 she married the marquis de Brinvilliers. Shortly after the marriage she fell in love with one of his friends, an adventurer named Gaudin de Sainte-Croix. Her husband did not interfere, but her father caused the arrest of Gaudin, who was incarcerated in the Bastille. Having there been taught by an Italian named Exili the preparation and application of a peculiar kind of poison, he became the instructor of the marchioness, who initiated her husband into the secret. The marquis having ruined himself by extravagance, the death of his wife's family was resolved upon, that they might obtain the property. He prepared the poison, and she experimented with it upon the sick in the Paris hospital, upon her guests, and upon her chamber maid. She made eight unsuccessful attempts upon her father before causing his death. She next poisoned her two brothers, and then attempted the death of her husband, who was saved by an antidote. Her paramour died of the effects of the poison while he was preparing it; a box was found in his house containing the poison and her love letters and other conclusive evidences of her crime, and she left Paris. Lachaussée, a servant who had assisted her in poisoning her brothers, put in a claim upon the effects of Sainte-Croix for wages due him. Being suspected, he was arrested and sentenced to death. Before his execution he made a full confession. Madame Brinvilliers, who had taken refuge in a convent at Liège, was arrested by a policeman, who gained access to her cell under the garb of a priest, and to her confidence under the character of a lover. He also secured her papers, among which one was found intended to be read after her death, in which she confessed that she had set fire to a house and poisoned her father, her brothers, one of her children, and herself. This paper was put in as evidence at the trial. On her refusing to admit its truth, she was taken to the torture room, when she confessed not only the crimes enumerated in the paper, but others which the government withheld from

public knowledge. Madame de Sévigné in her letters gives a graphic account of her execution. The poison she used was *aqua tofana*.

BRION, Luis, admiral of Colombia, born at Curaçoa, July 6, 1782, died Sept. 20, 1821. He was sent at an early age to Holland to receive his education, his father being a native of that country; he entered the Dutch army, and afterward visited the United States, where he studied navigation. Upon the death of his father he bought a vessel, made several voyages, established a mercantile house at Curaçoa, and in 1811 was appointed captain of a frigate in the service of the republic and state of Carácas. At his own expense he fitted out a fleet of vessels, and attacked the Spanish forces at the island of Margarita, where he gained a signal victory. Brion distinguished himself at the conquest of Guiana, and also at Santa Marta and Cartagena. The latter part of his life was rendered unhappy by a misunderstanding with Bolívar, which so preyed upon his mind that he became ill, and leaving the squadron returned to Curaçoa, and soon died in poverty.

BRIOUDE, a town of Auvergne, France, in the department of Haute-Loire, near the left bank of the Allier, on the site of the ancient town of Brivas, 29 m. N. W. of Puy; pop. in 1866, 4,932. The old bridge at La Vieille Brioude long celebrated as being the widest in span of any known, fell down in 1822. In the 16th century many of the inhabitants of Brioude rose in favor of Protestantism, but were subdued by the Roman Catholic party. Lafayette was born near this place, at Chadagnac. A considerable traffic in grain, hemp, and wine is carried on. The principal buildings are the college and the church of St. Julian. There is also a small public library. The railway from Clermont to Le Puy passes through it.

BRISACH. See BRISACH.

BRISBANE. I. A N. E. county of the colony of New South Wales, Australia, bordered on the S. by Hunter and Goulbourn rivers, and on the N. by the Liverpool mountains; area, 2,344 sq. m.; pop. in 1866, about 1,400. It consists chiefly of table land, diversified by a few plains and some high peaks, one of which is called the Burning mountain, or Mount Winggen, is in a state of combustion. The burning portion is from 1,400 to 1,500 feet above the sea. In 1866 there were 3,500 acres of land under cultivation, chiefly in wheat. There were 5,866 horses, 29,154 cattle, and 175,786 sheep. The principal towns are Murrurundi and Scone.

II. A town of Australia, capital of Queensland and of Stanley county, situated on the river Brisbane, about 25 m. from its entrance into Moreton bay, and 440 m. N. N. E. of Sydney; pop. in 1871, 19,418, of whom 15,029 belonged to the city proper and the remainder to the suburbs. The town is divided into four parts, North and South Brisbane, Kangaroo Point, and Fortitude Valley. The two former are connected by an iron bridge. It is the seat of a Roman Catholic and an Anglican bishop, and has a

mechanics' institute, school of arts, general hospital, and botanical gardens which are laid out with great taste and excellently kept. There were published in 1871 one daily newspaper, two tri-weeklies, one weekly, and one monthly. Steamers run to Sydney, and to the northern ports; there is also regular communication with London by sailing vessels. Owing to the bar at the mouth of the river, only vessels of a limited size can come up to the city.

BRISSON, Mathurin Jacques, a French savant, born at Fontenay-le-Comte, April 30, 1728, died at Boissy, near Versailles, June 23, 1806. He was instructor to the children of the royal family of France in physics and natural history. He was also royal censor, member of the academy of sciences and of the institute, and succeeded Nollet in the chair of natural philosophy at the college of Navarre. He translated Priestley's work on electricity, although he opposed his theories, and still more those of Franklin. The best of his writings are on specific gravity and on ornithology. Buffon quotes frequently from the latter work.

BRISSOT, Jean Pierre, a Girondist leader, surnamed De Warville after the village of Ouarville, near Chartres, where he was born, Jan. 14, 1754, died by the guillotine, Oct. 31, 1793. He had abandoned the law for literature, when a seditious publication, wrongly imputed to him, caused him to be imprisoned. Afterward he repaired to London, where he conducted a French journal; he then went to the United States, where he wrote against slavery, having previously been one of the original founders of *la société des amis des noirs*. Returning to France on the outbreak of the revolution of 1789, he became the editor of *Le Patriote Français*, and a member of the commune of Paris; and having labored assiduously, and with uncommon ability, in the interest of the revolution, he was chosen member of the legislative assembly, where he soon took a conspicuous position as a leader of the Girondists, who from him were frequently called Brissotins. After the king's flight, he put himself at the head of those who demanded his deposition, and eventually taking his seat in the convention as a representative of the department of Eure-et-Loire, he was instrumental in bringing about the declaration of war against Austria, England, and Holland. He made himself obnoxious to Robespierre and his party by opposing the immediate execution of the king, though he voted for his death, and was finally doomed to die on the same day with 20 of his political associates. (See GIRONDISTS.) He was the author of a great number of works and memoirs, chiefly on law, politics, and metaphysics. His work on the United States (1791) was translated into English, German, and Dutch. His biography was published in 4 vols. (Paris, 1829-'32).

BRISTED, I. John, an Episcopal clergyman and author, born in Dorsetshire, England, in 1778, died at Bristol, R. I., Feb. 23, 1855. He was educated at Winchester, studied law, came

to America in 1806, and practised in New York. In 1820 he married a daughter of John Jacob Astor. Having studied divinity under Bishop Griswold, he succeeded him in 1829 as rector of the church of St. Michael at Bristol, which office he discharged till 1848. Among his works are: "A Pedestrian Tour through part of the Highlands of Scotland" (2 vols. 8vo, London, 1804); "Critical and Philosophical Essays" (1804); "Edward and Anna," a novel (1805); "The Resources of the United States" (New York, 1818); and "Thoughts on the Anglican and Anglo-American Churches" (1822). **II. Charles Astor**, an American author, son of the preceding, born in New York in 1820. Having completed the course at Yale college, he entered in 1840 the university of Cambridge, England, and graduated at Trinity college in 1845, with high honor as a classical scholar. He has since passed many years in Europe, has written much for newspapers and magazines, usually under the signature of Carl Benson, and has published several books, among which are: "Selections from Catullus," with notes (1849); "Letter to Hon. Horace Mann," being a reply to attacks made upon Stephen Girard and John Jacob Astor; "The Upper Ten Thousand of New York" (1852); "Five Years in an English University" (1852; new ed., 1872); and "The Interference Theory of Government" (1867). He was one of the original trustees of the Astor library.

BRISTOL. I. A S. E. county of Massachusetts, bounded S. E. by Buzzard's bay, and W. by Rhode Island, and drained by Taunton and Pawtucket rivers; area, 517 sq. m.; pop. in 1870, 102,886. It is diversified by many irregularities of surface. Its seacoast, about 18 m. in extent, is indented by numerous bays and good harbors. Iron ore is found in large quantities. Manufacturing is extensively carried on, particularly at Fall River. New Bedford is the chief whaling port of the country. The Boston and Providence, New Bedford and Taunton, Taunton branch, and Fall River railroads pass through the county. There are 27 cotton mills, 2 calico print works, 2 woollen mills, 4 shoddy mills, 6 brass foundries, 18 flour mills, 6 tanneries, 54 saw mills, 3 manufactories of spool cotton, 10 rolling and splitting mills, and numerous other manufactories. The chief productions in 1870 were 7,928 bushels of rye, 82,256 of Indian corn, 40,003 of oats, 237,675 of potatoes, 27,091 tons of hay, and 223,986 lbs. of butter. There were 2,668 horses, 5,671 milch cows, 3,908 other cattle, 2,281 sheep, and 3,773 swine. Capitals, New Bedford and Taunton. **II.** An E. county of Rhode Island; area, 25 sq. m.; pop. in 1870, 9,421. Mount Hope and Narragansett bays bound it E., S., and W. The surface is uneven, and presents a variety of beautiful scenery. The soil is very fertile. A railroad from Bristol to Providence passes through the county, and another extends from Fall River to Warren. The chief productions in 1870 were 13,521 bushels of Indian

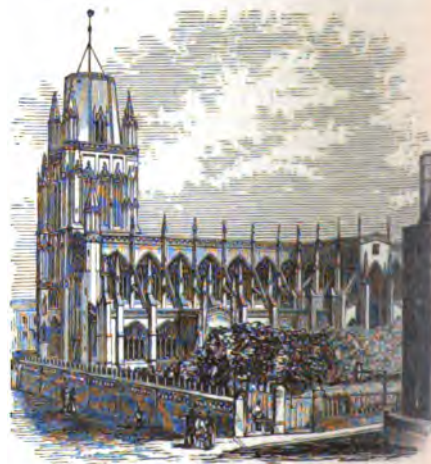
corn, 5,934 of oats, 34,996 of potatoes, and 2,551 tons of hay. There were 399 horses, 664 milch cows, 571 other cattle, 473 sheep, and 648 swine. Capital, Bristol.

BRISTOL, a town, port of entry, and the capital of Bristol co., R. I., 16 m. by rail S. E. of Providence, and 11 m. N. of Newport; pop. in 1870, 5,302. It is pleasantly situated on a peninsula stretching out toward the south, between Narragansett bay on the west and Mount Hope bay on the east. The town is 5 m. long and 3 m. broad, and has an area of 12 sq. m. It includes Mount Hope, a beautiful eminence 300 ft. above water, noted for the fine view from its summit, and interesting as the ancient residence of King Philip, who was killed here in 1676. The soil is very fertile, and a considerable portion of the inhabitants are engaged in raising onions and other market vegetables. The village is a place of summer resort, and contains a newspaper office, several churches, banks, manufactories, and good schools. During the revolutionary war it was bombarded by the British, and a large part of it burned to the ground. A railroad connects it with Providence, and steamers from Fall River to the latter city also stop here. For the year ending June 30, 1871, the imports from foreign countries into the district (which also includes Warren) amounted to \$37,161; exports, \$30,329. There were registered 22 vessels with a tonnage of 2,139.

BRISTOL, a post borough, and formerly the capital of Bucks co., Penn., on the right bank of the Delaware river, nearly opposite Burlington, N. J., and about 19 m. above Philadelphia; pop. in 1870, 3,269. It is a pleasant, neat-looking town, with several churches, a bank, a flour mill, a mineral spring, and abundant means of communication with the chief cities of the Union. A quarterly periodical is published here. A railroad from New York to Philadelphia passes through it, a line of steamboats connects it with Philadelphia, and the Delaware branch of the Pennsylvania canal terminates here in a large basin communicating with the river.

BRISTOL, a seaport and city of England, on the borders of Gloucestershire and Somersetshire, but independent of both, situated at the confluence of the Avon and Frome, 8 m. from their entrance into the estuary of the Severn, the head of Bristol channel, 12 m. N. W. of Bath, and 118 m. W. of London; pop. in 1871, 182,524. The Avon being navigable for large vessels up to this point, gives to Bristol great commercial advantages, which have been further improved by dock accommodation. The British docks, which were originally formed in the reign of George III., at an expense of £600,000, were purchased in 1847 by the corporation, and are now the property of the city. Bristol was long the second city of the kingdom, and from 1750 to 1757 the average net receipts of the customs there amounted to £155,189 sterling, while those of Liverpool

were £51,136. But in the latter part of the century the advantages of Liverpool in natural position, and her vicinity to the northern coal iron, and manufacturing districts, rapidly secured her the superiority; and the West India trade, which formerly belonged exclusively to Bristol, has been in the present century transferred to London, since the completion of the West India docks. The growth of railway communication has also partly deprived Bristol of its long standing character as the commercial depot of the west of England. It is still the great point of shipment between the south of Ireland and England. Numerous manufactures are carried on, among which are refined sugar, brass and copper wares, soap, glass chain cables, anchors, machinery, tobacco earthenware, floor cloth, wire, pins, shot, sheet lead, zinc, saltpetre, tin pipes, hats, spirits malt liquors, and soda. There is a large cotton factory, employing 1,700 hands, and other manufacturing establishments are on a large scale. There are seven banking establishments including a branch of the bank of England, savings bank, and a gas company. The tides in the Bristol channel rise 48 ft. at springs and 23 at neaps, and at the floating harbor often to 30 ft., so that vessels of the largest draught come to the city. To obviate the risk of damage at the rise, and of grounding at low tide, a floating harbor or wet dock has been constructed, by changing the bed of the river Avon for a length of 3 m. There is a quay a mile in length, and a number of basins. Five bridges connect the opposite sides of the floating harbor and river. There are also graving docks and ship yards, suitable for vessels of the largest size. The Great Western and Great Britain, besides many other large steamers



Church of St. Mary Redcliff.

were built at this port. Three railways, the Bristol and Gloucester, the Great Western, and the Bristol and Exeter, have termini in the

city. There are numerous interesting monuments of antiquity, among which the church of St. Mary Redcliff is conspicuous both for its beauty and for Chatterton's connection with it. The cathedral has a fine Norman gateway. Among the modern buildings are the council house, in the Italian style, the guildhall, in the



The Guildhall.

Tudor style, the Victoria rooms for concerts and exhibitions, the Bristol institution, with a fine gallery of art, and the bridewell prison, rebuilt after the riot of 1831. The Bristol library, founded in 1772, has 50,000 volumes. Clifton, a suburb of Bristol, is a noted watering place. (See CLIFTON.)—Bristol dates from before the Roman invasion, but did not become a place of strength and importance till after the Norman conquest. In the 12th and 13th centuries it was noted both for its trade and manufactures. By the enterprise of Bristol merchants some of the early expeditions for the extension of discovery in the western world were fitted out. Sebastian Cabot passed his early life in Bristol, and a Bristol ship first touched the American continent. Martin Fro-bisher brought one of the Esquimaux to Bristol in 1578. Hakluyt belonged to Bristol, and Newfoundland was colonized from Bristol. It figured in the wars of the roses, and was a commanding position during the war between Charles I. and the parliament. It was carried by storm by Prince Maurice and Prince Rupert in 1643, but after the defeat of Charles at Naseby was surrendered by Prince Rupert to Sir Thomas Fairfax, after a brief resistance. It was the scene of riots on account of local disputes in 1793, and of a disastrous riot in 1831, on occasion of a visit from Sir Charles Wetherell, an opponent of the reform bill.

BRISTOL BRICK, a sort of brick used for cleaning steel, manufactured for some years exclusively in Bristol, England. A small vein of the sand required for this purpose was found near Liverpool, but was soon exhausted. One of the owners or operatives, who had been concerned in the works at Bristol, visited the United States in 1820, where by accident he discovered that the same kind of sand which was used for the Bristol bricks might be procured at South Hampton, N. H. Since that period bricks fully equal to the imported article have been manufactured in this country.

BRISTOL CHANNEL, a body of water separating the southern portion of Wales and Monmouthshire in England from the counties of Devon and Somerset, and composed of the estuary of the river Severn and the broad arm of the sea into which that river empties. It may be said to extend from the mouth of the Bristol or lower Avon, where its width is about 5 m., to the Atlantic, into which it enters between Hartland point, in Devonshire, and St. Gowan's head, in Pembrokeshire, Wales. Its width between these capes is about 40 m. It is bounded by shores as irregular in outline as they are various in their general features, and the whole coast, but especially that on the north, is remarkably picturesque.

BRIT (*clupea minima*, Peck), a small species of herring, varying in length from one to four inches, found at some seasons of the year in immense numbers on the coast of New England; it serves as food for the bluefish and other predatory species. The back is nearly black, the upper part of the sides dark green, and the sides silvery with roseate and golden reflections; the lateral line is very high up, and the abdominal ridge is serrated; the lower jaw rather projects beyond the upper. It used to be very abundant in the bay of Fundy, but is rare there of late years; it is said to be frequently met with in the gulf of St. Lawrence, and is mentioned by De Kay in his "Fishes of New York." In the young specimens the dorsal ridge is a black line, and the space between this and the lateral line is light green, with small darker points. Its immense numbers might make it of value in some localities as a manure, and as a bait for other fish.

BRITAIN, or *Britannia*, an ancient name of the island of Great Britain. The first name given to the island by the earliest Greek writers whose works have come down to us was Albion, which is supposed to have been formed from the Celtic *alb* or *alp*, meaning according to some authorities white, according to others high, and applied to the island either from the white appearance of its chalky cliffs on the south, or from its northern mountains. The natives themselves are said to have called it *Eilaban*, "the white island," from which Albion could easily be formed. The origin of the word Britain is even more uncertain than that of Albion. Camden supposed it to be formed from *brit*, a Celtic word signifying painted, and that it therefore means the land of the painted people. Carte more probably derives it from Brydtrain, the name which the natives called themselves by, and which was easily latinized into Britain. The aboriginal or at least the earliest inhabitants of Britain were of Celtic origin and race, as is evident from the fact that nearly all the names of mountains, lakes, and rivers in the island are still descriptive and significant in the Celtic language. At a very early period, however, and before we have any authentic knowledge of Britain, its Celtic population seems to have been conquered and dis-

placed by Gothic tribes who at the time of Cæsar's invasion, when the history of Britain begins, occupied the S. E. part of the island, and had driven the Celts into the remoter and less accessible districts. Before the time of Cæsar, however, nothing is really known of Britain beyond some vague allusions by Herodotus and a statement by Aristotle that in the western ocean there were two large islands, Albion and Ierne, which were called Britannia. The Phœnicians and Carthaginians knew the island and traded with the natives for tin, but they have left no record of their knowledge of it. (See ENGLAND.)

BRITANNIA METAL, also called white metal, an alloy of 86 parts of tin, 10 of antimony, 8 of zinc, and 1 of copper. Its composition, however, is somewhat variable. Dr. Thomson gives the analysis of one specimen: tin, 85.72; antimony, 10.39; zinc, 2.91; copper, .98=100. It is cast into ingots and rolled into thin sheets. It is an alloy of great use for the manufacture of domestic utensils, and is very generally employed as the base of articles designed to be plated with silver. It was first manufactured in England about 1770, by Jessop and Hancock.

BRITANNICUS, son of the emperor Claudius and Messalina, born in A. D. 42, in the second consulship of his father, died in 55. His original name was Claudius Tiberius Germanicus, but when the senate conferred the title of Britannicus on the emperor, the infant prince was allowed to participate in the honor, which henceforward became his distinctive appellation. After the death of his mother, and the marriage of his father with Agrippina, that unscrupulous woman prevailed on Claudius to set aside the claims of Britannicus to the throne, and to make her own son Nero his heir. After the accession of Nero, Agrippina, having quarrelled with him, threatened to present Britannicus to the legions, and Nero determined to rid himself of so dangerous a rival. A dose of poison was dissolved in a goblet of wine and handed to him at a banquet. He drank, and immediately expired. As his funeral passed to the Campus Martius a storm raged, and the rain, according to a somewhat doubtful statement in Dion Cassius, washed from his visage the paint with which it had been smeared, and exposed his swollen and blackened features.

BRITISH AMERICA, the whole of North America N. of the United States, with the exception of Alaska, the N. W. corner of the continent. The boundary line between British America and the United States was mainly determined by the conventions of 1839 and 1846; and finally, as to the disputed possession of the island of San Juan, in 1872, by the arbitration of the emperor of Germany. The extreme southern point of British America is on or near Middle island, in Lake Erie, lat. 41° 40' N. British America is bounded N. by the Arctic ocean, N. E. and E. by Baffin bay, Davis strait, and the Atlantic ocean, S. by the United States,

and W. and N. W. by the Pacific ocean and Alaska. The total area about 3,500,000 sq. m.; pop. 4,455,000. British America, as organized under regular governments, comprises the Dominion of Canada, Prince Edward island, and Newfoundland. (See those titles.)

BRITISH BURMAH. See BURMAH, BRITISH.

BRITISH COLUMBIA, a province of the Dominion of Canada, on the Pacific coast, between lat. 48° 19' and 60° N., and lon. 113° and 136° W., bounded N. by the 60th parallel, E. by the Rocky mountains, which extend N. W. and S. E. from lon. 120° to 113° S. by the United States, and W. by the Pacific ocean and Alaska; area, including Vancouver and other islands, about 233,000 sq. m. The population, according to an enumeration made in the spring of 1871, consists of 8,576 white, 462 negroes, and 1,548 Chinese; total, 10,586, exclusive of Indians, estimated at 85,000 to 40,000, who subsist by fishing, hunting, and trapping fur-bearing animals. The coast line is deeply indented. Vancouver island extends from lat. 48° 19' to 50° 53' N., a distance of 278 m., along the southern portion of the mainland, from which it is separated by the gulf of Georgia, 90 m. in width. The N. entrance to the gulf is Johnston's strait, and the S. entrance is the strait of Juan de Fuca, which separates the S. shore of the island from the territory of the United States. Queen Charlotte islands, lying between lat. 52° and 54° N., and lon. 131° 25' and 134° W., are separated from the N. portion of the coast by Queen Charlotte sound. The country is generally mountainous, though the interior is much diversified. There are extensive tracts of arable land, and large sections suitable for grazing purposes. The E. portion is occupied by the Rocky mountains, the highest summits of which are Mt. Hooker, 15,700 ft., and Mt. Browne, 16,000 ft. The Cascade mountains, a continuation of the Sierra Nevada range of California, intersect the country from N. to S. about 100 m. from the coast. Contiguous to the coast is another lofty range extending N. into Alaska. Between Fraser and Thompson rivers is a large tract of level forest. The surface of Vancouver island is very mountainous and covered with forests of pine and cedar; it contains little agricultural land, but is supposed to be rich in minerals. The rivers are numerous and large, but their navigation is much interrupted by frequent rapids and falls. The Columbia rises in the vicinity of the Rocky mountains, in lat. 50° 30' N. and lon. 116° W., and flows N. W. to lat. 52° 10', when it takes a S. course to the United States. It is navigable as far as the head of Upper Arrow lake, lat. 50° 30'. Fraser river has its sources on the W. slope of the Rocky mountains, in lat. 52° 25' and lon. 118° 40', and after a N. W. course of about 160 m. to lat. 54° 30', turns abruptly and flows nearly due S. to lat. 49° 30', when it turns W. and flows to the gulf of Georgia near the United States border. It drains the E. slope of the Cascades and the W. slope

of the Rocky mountains. In a right line it is less than 500 m. long, but with its meanderings 800 m. The river is navigable for about 100 m. of its lower course, and about 80 m. midway between its source and mouth. The Fraser has several affluents, the chief of which are Thompson, Harrison, and Lilloet rivers. The first named rises in the Rocky mountains, flows W., and joins the Fraser in lat. 50°. Peace river rises on the N. slope of the range which deflects the Fraser from its N. to S. course, and flows N., where it joins the Finlay. The Stikkeen and Simpson are also considerable rivers, in the north of the territory, flowing into the Pacific. There are numerous lakes, the largest of which, the Upper and Lower Arrow, are connected with the Columbia river. Lake Okanagan has for its outlet the river of the same name. Pitt, Harrison, Lilloet, Anderson, Quesnelle, and Caribou lakes are connected with Fraser river. Some of these lakes are navigable. The open country around Lake Okanagan varies in height up to 1,500 ft. above the level of the sea; round Nicola lake up to 2,000 ft.; round Lake La Hache to over 2,500 ft. The plateau between Clinton and Bridge creeks has an elevation of from 3,500 to 4,000 ft. The climate is healthy, and generally milder than in the corresponding latitude eastward of the mountains. On the coast the winter is more humid than cold. The lakes are never wholly frozen, and travel is never impeded by the snow except in the mountain passes. All the harbors remain open throughout the winter except that of New Westminster, where the floating ice is dangerous to shipping from January to March. From the middle of October till March there is much rain, with high winds. Winds from the S. and S. E. bring rain, and from the N. and N. W. fair weather. The central and eastern districts have from their elevation a severer climate, and in the upper country the thermometer in winter sometimes indicates 40° below zero.—The soil of the valleys is generally fertile, but is subject to floods. The plateaus are barren, while the hillsides are generally covered with good timber. The districts fit for agricultural settlement are thus estimated: On Fraser and Thompson rivers, 60,000 sq. m.; sources of the upper Columbia, 20,000; Athabaska district, 50,000; Vancouver island, 16,000. The tract extending from Thompson river to the Rocky mountains is described as eminently suitable for colonization. It possesses abundance of timber and of bituminous coal, is diversified by hill and dale, watered by numerous streams and lakes, and has boundless pasturage. The soil, as elsewhere throughout the country, varies from a deep black vegetable loam to a light brown loamy earth, the hills supplying slate and building stone. The land on the lower course of Fraser river is also good, but it is covered almost entirely with dense forests. Wheat, oats, barley, Indian corn, peas, beans,

potatoes, turnips, carrots, &c., have been successfully raised; while garden produce, tomatoes, cucumbers, &c., ripen early. There is abundance of grass for cattle and flocks during the summer, and plenty of hay obtained for their support during the winter. Agriculture, however, is in a backward state. In the forests are found cedar, pine, fir, maple, hemlock, birch, poplar, willow, alder, and cottonwood trees, besides a variety of grasses and flowers. Sheep raising has been introduced with success. The country is rich in fur-bearing animals, chiefly black, brown, and grisly bears, lynx, marten, and beaver. It was formerly the richest fur district of the Hudson Bay company. Fish abound in the lakes and rivers; salmon are especially plentiful, and of four species, the largest being from 10 to 20 lbs. in weight. They proceed up Fraser river in countless numbers, till stopped by shallow water, few of them returning to the sea.—Although gold has been discovered in almost every part of the territory, and especially upon and E. of Fraser river, the fields which have been most extensively worked are in the Caribou district, which lies in the N. bend of Fraser river, about lat. 58° 20'. Gold is also found in the Thompson and many of its smaller tributaries, on the Peace, and also on Gold stream and Leech river in Vancouver island. The gold is mostly in grains, few large pieces or "nuggets" having been found. Mining operations have been limited mainly to alluvial deposits, quartz crushing not having been introduced. The Caribou mines have been worked without interruption since their discovery, but for some years have yielded less than \$1,500,000 per annum. The number of miners is about 2,000. According to the report of the commissioner of mines, the total amount of gold exported from the colony in 1869 was \$2,417,873, exclusive of about \$1,000,000 taken away by individuals. In 1870 it sank to \$1,002,717, and in 1871 to \$784,792, exclusive of what was taken away privately, about one third more. From 1862 to Sept. 20, 1871, the whole amount publicly exported was \$16,650,086. The tardy development of the mines is attributed to the want of a geological survey, which has now, however, been undertaken. Veins of silver have been discovered near Fort Hope and on Cherry creek near Shushwap lake, but are yet undeveloped. Nuggets of native silver have been found on Peace river, indicating the presence of extensive deposits in that region. Veins of copper and lead are numerous, and prospecting has been done on the former, but without satisfactory results. Rock crystals, cobalt, talc, and iron ore exist near Fraser river. Platinum, cinnabar, plumbago, and agate have also been found. Coal abounds in several localities. Beds of valuable bituminous coal have been profitably worked on Vancouver island, where the annual produce amounts to about 50,000 tons, of which about 20,000 tons were exported in 1869. It is about 10 per cent.

lighter than Welsh coal, and its consumption is so much more rapid. The anthracite contains 70 per cent. of carbon, and is of superior quality. A large area of the N. W. portion of the island is mainly of the bituminous coal formation. Similar beds exist also on Queen Charlotte island. The annual exportation of coal, chiefly to San Francisco, amounts to about \$200,000.—The chief port and commercial town is Victoria, the capital, on Vancouver island, containing about 4,000 inhabitants. New Westminster is on Fraser river, about 15 m. from its mouth, and has about 1,000 inhabitants. The other principal points are Langley, Fort Hope, Fort Yale, and Lilloet on Fraser river, and Douglas on Harrison lake. Most of these places are connected with the United States by telegraph. The exports are gold, coal, furs, spars, lumber, fish, fish oil, wool, and cranberries; the imports are provisions, clothing, furniture, and tools. Large numbers of spars, unequalled in length and quality, are exported. The exports of lumber amount to about \$120,000 annually. The aggregate value of imports which passed into the colony through the port of Victoria in 1869 was \$1,776,628, and of exports, including gold, \$719,208. In 1870 the exports, exclusive of gold, amounted to \$208,864. The entrances in 1869 were 864 vessels, of 189,684 tons, and the clearances 896 vessels, of 202,551 tons. The next year, 835 vessels of 178,209 tons entered, and 804 of 170,624 tons cleared. The total exports from British Columbia and Vancouver island to the United Kingdom amounted to £63,681 in 1867, £76,614 in 1868, £51,490 in 1869, £60,751 in 1870, and £76,644 in 1871. The chief articles of export in 1871 were train or blubber oil, to the value of £9,651; seal skins, £6,850; other skins and furs, £41,472; hewn wood and timber, £16,819; wool, £268; other articles, £1,584. The imports from Great Britain amounted to £108,206 in 1869, £73,581 in 1870, and £78,481 in 1871. The total revenue raised throughout the colony in 1869 amounted to \$530,470, and the expenditures to \$517,332.—British Columbia is represented in the parliament of the Dominion of Canada. The territorial officers are a governor, appointed by the English crown, a secretary, a commissioner of lands and public works, and a collector of customs. The law officers are two judges, an attorney general, a registrar, and a high sheriff. The legislative council consists of 15 members, 5 of whom are public officers, 5 are selected by the governor, and 5 are elected by the people subject to the approval of the governor. The elected assembly of Vancouver has been discontinued, and that island is represented in the legislative council of British Columbia. Four newspapers, of which two are daily, are published in the province, and there are three libraries with 4,000 volumes.—British Columbia, comprising the territories formerly known as New Caledonia, New Georgia, New Norfolk, and

New Cornwall, was prior to 1858 entirely under the control of the Hudson Bay company whose trading posts were stationed at various points on the coast and in the interior. The discovery of gold in that year caused an influx of population and the formation of a colony. It is estimated that the number of immigrants in 1858, chiefly from California, was not less than 20,000. On the first influx, the governor of Vancouver island took prompt measures to secure to the British government the royalty of the minerals by imposing a license tax, and to maintain the Hudson Bay company's monopoly by forbidding the importation of goods other than through the company's agencies. He also forbade to foreign ships the navigation of Fraser river. By an act of parliament passed Aug. 2, 1858, British Columbia was created a distinct colonial government, comprising the territory as far N. as Simpson river and the Finlay branch of Peace river. In 1868 the N. boundary was extended from about lat. 56° to 60° N. The colony included all the adjacent islands except Vancouver, which was incorporated with British Columbia under the government in 1866. In 1871 British Columbia was admitted into the Dominion of Canada. The leading condition of the union was an agreement on the part of the Dominion government to construct a railroad connecting the Pacific coast with the eastern provinces. The railroad, the Canadian Pacific, is to be not less than 2,500, and may be 2,700 m. long, extending from Victoria to some point in the province of Ontario, possibly to Lake Nipissing about 200 m. N. of Toronto. It is to be completed by 1881. It is expected to develop the valuable mineral districts of the province, and divert the China and Japan trade from the present channel.

BRITISH EMPIRE, a vast complex of states in various parts of the world, subject to the crown of England. Its different portions will be treated under their several names. We here present a condensed view of them all together.

IN EUROPE.—The *United Kingdom of Great Britain and Ireland*, with the adjacent islands in the British seas, including the Shetlands, Orkneya, Hebrides, Scillies, Man, the Channel islands, and the Isle of Wight; area 121,115 sq. m.; pop. in 1871, 31,817,108. Wales was incorporated into the Kingdom of England in the reign of Edward I. Scotland, whose sovereign became king of England in 1603, long continued distinct for administrative and legislative purposes. It was finally joined to England by the act of union in 1707, by which the Scottish legislature was dissolved, and the Scotch were admitted to representation in the British houses of lords and commons. The Scotch still maintain their own peculiar laws, customs, and national church. Ireland was nominally annexed to the crown of England in 1172; but for centuries resisted the invader, and can scarcely be said to have been subjugated until it was reduced by Cromwell. It was governed by its own parliament till 1800, when by an act of union it was united to England, and, like Scotland, admitted to rights of representation both by peers and commoners in the British parliament. Its laws are essentially the same as those of England, though passed specially for Ireland. The Anglican church was imposed upon Ireland as a state church, with the endowments of the ancient Catholic church, although less than one eighth of the population are members of its communion; but it was finally disestablished in 1871. *Heligoland*, a small island in the German ocean, inhabited chiefly by fishermen, taken from the Danes in 1807; area, 0.21 sq. m.; pop. in 1860, 2,173. *Gibraltar*, taken from the Spaniards in 1704, consisting of a lofty steep rock, bristling with guns, and

regularly fortified, and a small space of sloping ground at its foot on which stands its town; area, 2 sq. m.; pop. in 1871, 13,686. *Malta*, a strongly fortified naval and military station, with its dependency Gozo, taken from the French in 1800; area of both, 143 sq. m.; pop. in 1866, 189,502.

IN ASIA.—*British India* is divided into British possessions and native states more or less under the control of the British government. Since Aug. 2, 1853, all the territories heretofore under the government of the East India company have been vested in the crown, in the name of which all authority is exercised. The executive authority is vested in a governor general, who acts under the orders of the secretary of state for India, and also appoints various lieutenant governors and commissioners for the several presidencies and provinces. The provinces of Hyderabad, Mysore, and Coorg (47,661 sq. m., pop. 6,339,792) are under the direct administration of the governor general. The remainder is under the following functionaries: lieutenant governor of Bengal, 239,591 sq. m., pop. 3,975,274; lieutenant governor of Northwest Provinces, 83,375 sq. m., pop. 30,086,893; lieutenant governor of the Punjab, 102,001 sq. m., pop. 17,596,752; chief commissioner of Oude, 21,060 sq. m.; pop. 11,220,747; chief commissioner of Central Provinces, 54,162 sq. m., pop. 7,935,411; chief commissioner of British Burmah, 95,881 sq. m., pop. 2,463,434; governor of Madras, 141,745 sq. m., pop. 26,583,052; governor of Bombay, 77,632 sq. m., pop. 11,098,512; commissioner of Sind, 54,408 sq. m., pop. 1,795,594. Total area of British possessions in India, 963,929 sq. m., pop. 151,146,426. There are some 60 or 70 native chiefs and states under the control of the British government; area, 646,147 sq. m., pop. 46,245,883. Besides India, the British possessions in Asia include the islands of *Ceylon* and *Singapore*, *Hong Kong* in China, and a few small settlements, with a total population of about 2,800,000; also *Aden*, a seaport at the mouth of the Red sea, pop. about 50,000.

IN AFRICA.—*Cape Colony*, extending from the Cape of Good Hope to the Orange river, taken from the Dutch in 1806; 200,610 sq. m., pop. 566,158. *Port Natal*, N. E. of Cape Colony, settled in 1893; 17,801 sq. m., pop. 209,383. *Sierra Leone*, settled in 1787, as a colony for slaves who had been released from their captors; 463 sq. m., pop. 55,374. *Gambia*, N. of Sierra Leone, settled in 1681; 21 sq. m., pop. in 1851, 6,989. The *Gold Coast Settlements*, comprising several forts and trading posts, of which Cape Coast Castle is the chief; 16,626 sq. m., pop. estimated at 400,000. *Mauritius*, and several small islands adjacent, lying in the Indian ocean, taken from the French in 1810; 703 sq. m., pop. 332,924. *St. Helena*, an island in the Atlantic, ceded by the Dutch in 1651; 47 sq. m., pop. 6,460. *Ascension*, an almost uninhabited rock N. of St. Helena.

IN AMERICA.— *Dominion of Canada*, comprising the former territorial divisions of Canada, New Brunswick, Nova Scotia, Hudson Bay territory, British Columbia, and Vancouver island; 3,431,779 sq. m., pop. 8,648,000. *Newfoundland*; 40,300 sq. m., pop. 146,536. *Prince Edward Island*; 2,173 sq. m., pop. 94,021. *The Bermudas*, in the Atlantic ocean, off the coast of the United States; 24 sq. m., pop. 11,796. *West India Islands*; 12,636 sq. m., pop. 1,028,708. *British Honduras*; 13,500 sq. m., pop. 25,635. *British Guiana*, taken from the French in 1803; 99,925 sq. m., pop. 122,312. *Falkland Islands*, in the Atlantic, off the S. E. coast of South America; 4,741 sq. m., pop. 686.

IN AUSTRALASIA.—*Australia*, 2,973,127 sq. m., pop. in 1871, 1,561,037, comprising the following colonies: New South Wales, organized in 1788; 828,437 sq. m., pop. 501,611; Western Australia, organized in 1829; 978,000 sq. m., pop. 24,785; South Australia, organized in 1836; 333,328 sq. m., pop. 188,995; Victoria, organized in 1851; 86,881 sq. m., pop. 729,868; Queensland, organized in 1859; 678,000 sq. m., pop. 115,567; Northern territory, not yet organized, 528,531 sq. m., pop. 201. *Tasmania*, formerly Van Diemen's Land, settled in 1803; 26,215 sq. m., pop. 97,806. *New Zealand*, settled in 1839; 106,259 sq. m., pop. 294,028. *Labuan*, an island near Borneo; 50 sq. m., pop. 3,423. *Sarawak*, a protected state in the island of Borneo, established in 1844 by Sir James Brooke; 8,000 sq. m., pop. 30,000.

The following table gives approximately, in round numbers, the area and population of the British empire:

COUNTRIES.	Area, square miles.	Population.
Europe	121,000	82,000,000
Asia	1,640,000	200,000,000
America	3,700,000	5,000,000
Africa	250,000	1,700,000
Australasia	3,100,000	2,000,000
Total	8,811,000	240,700,000

BRITISH GUM, a name given by calico printers to dextrine, produced by heating starch to about 400° F., or until it becomes soluble in cold water and loses its property of forming a blue color with iodine. It is used for stiffening fabrics, and also as an adhesive substance on postage stamps, on labels, on photographic pictures, and the like. (See DEXTRINE.)

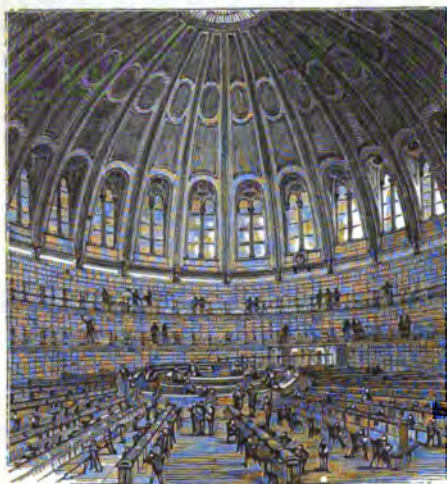
BRITISH MUSEUM, a national depository of science, literature, and art, which owes its origin to the will of Sir Hans Sloane, who died in 1753, and bequeathed to the nation his collection of medals and coins, antiquities, seals, cameos, drawings and pictures, and his library, consisting of 50,000 volumes and manuscripts, on the condition of the payment to his heirs of £20,000, being less than half its cost. Parliament accepted this condition, by an act passed in June, 1753, and directed that the Cottonian library, a collection of historical documents made by Sir Robert Cotton during the reigns of Elizabeth and James I., which had been acquired by government in the reign of Queen



British Museum.

Anne, should be added to the Sloane collection, together with a library of about 2,000 printed volumes, called Major Arthur Edward's library, which had existed as an appendage to the Cottonian library since 1738. The book department of the British museum was still further increased by the purchase, for £10,000, of the Harleian library of manuscripts, a collection of about 7,600 volumes of rolls, charters, and other historical documents, which had been accumulated by Robert Harley, earl of Oxford, and his son and successor, Edward Harley. The act of parliament for founding the museum authorized a lottery of £100,000, out of which £10,250 were expended for Montague house with its gardens of 7½ acres, £12,873 were laid out in repairs, and £30,000 were set apart as a fund for the payment of salaries (which at first were moderate), taxes, and other expenses. The collection has since been increased by the munificence of successive parliaments, and by gifts, bequests, and copyrights, until it constitutes a national institution unrivalled in variety and extent by any similar one in the world. It is situated in Great Russell street, Bloomsbury, London. From the rapid increase of the various collections a more commodious

structure became necessary. The present edifice, designed by Sir Robert Smirke, was commenced in 1823, and completed by his younger brother, Sidney Smirke; and in 1845 Montague house was levelled with the ground, and the new portico was finished April 19, 1847. According to the report of the commissioners appointed in 1847-'8, to examine into its constitution and government, the buildings alone had cost since 1823 nearly £700,000. The reading room, completed in 1857, cost £150,000



Reading Room.

more. It is circular, surmounted by a dome 106 ft. high and 140 ft. in diameter, being one foot more than that of St. Peter's, and two feet less than that of the Pantheon; it can accommodate 300 readers, each having a separate desk. The entire public expenditure for the maintenance of the institution, and for the purchase of the various collections, from 1755 to 1858, was more than £1,500,000; in addition to which there have been numerous bequests from private individuals.—The museum consists of seven departments: manuscripts, printed books, antiquities, prints and drawings, mineralogy and geology, zoölogy, and botany; to which should be added the reading room. All of these departments are under separate keepers, to whom and their assistants and subordinates the business of the museum is intrusted. The library occupies the ground floor of the present building, filling 25 spacious departments and galleries, one of which measures 300 ft. in length. In July, 1838, the volumes of printed books, being counted one by one as they stood upon the shelves, were found to be in round numbers 235,000. Counted in the same manner in December, 1849, they were found to amount to 435,000. In May, 1851, they amounted to 460,000, and in July, 1853, to 510,110. In 1860 the number of printed volumes was estimated to be nearly 700,000; and as they increase at the rate of 20,000

a year, the number must now considerably exceed 1,000,000, not counting separate parts and pamphlets. There are 40,000 volumes of manuscripts, exclusive of more than 20,000 original rolls, charters, and deeds. There is also a collection of pamphlets exceeding 200,000 in number, illustrative of English and French history, and a series of newspapers going back to the first appearance of these publications early in the 17th century. The museum contains twice as many books relating to American history as are to be found in any library in the United States. The collection of Hebrew books is the largest in the world. As a whole the library of the British museum is inferior only to the national library at Paris. The manuscript collections are deposited in four rooms, situated at the southern extremity of the east wing, adjoining Great Russell street. These collections, which have been pronounced to be the most numerous and in some respects the finest in the world, are 11 in number, several of which once belonged to the private libraries of men eminent in rank, and of refined taste and culture. They are as follows: Sloane, acquired in 1753, containing 4,100 volumes; Cottonian, 900 volumes; Harleian, 7,689 volumes; Royal, 1,950 volumes; Lansdowne, in 1807, 1,245 volumes; Hargrave, in 1813, 499 volumes; Burney, in 1817, 524 volumes; King's, in 1823, 438 volumes; Egerton, in 1829, about 2,000 volumes; Arundel, in 1831, 550 volumes; additional about 5,000 volumes. The progress of the printed collections will be best understood from the following brief chronological summary of the more important donations and purchases made since the foundation of the library in 1753: 1759, a collection of Hebrew books, 18 volumes, presented by Solomon da Costa; 1762, a unique collection of tracts, published 1640-'60, consisting of about 30,000 articles, presented by George III.; 1766, a collection, rich in biography, bequeathed by the Rev. Dr. Birch; 1768, a collection of Bibles, bequeathed by Arthur Onslow; 1786, a collection of classical authors, 900 volumes, bequeathed by Mr. Tyndal; 1799, a collection of rare editions of the classics and of Italian authors, 4,500 volumes, bequeathed by the Rev. Clayton Mordaunt; 1815, Dr. Burney's collection of books on music, purchased; a collection of books belonging to Baron de Moll, 20,000 volumes, purchased at Munich; 1818, Dr. Burney's library of printed books, valued at 9,000 guineas purchased by a special parliamentary grant; 1820, a splendid library, rich in scientific journals and books on natural history, 16,000 volumes, bequeathed by Sir Joseph Banks; 1823, the magnificent library formed by George III., at a cost of £130,000, amounting to about 80,000 volumes, presented by George IV.; 1847, a collection of the Chinese books of Robert Morrison, in 11,500 volumes, presented by the secretary of state for the foreign department; 1847, the library of Thomas Grenville, 20,240 volumes, collected at a cost

of upward of £54,000, bequeathed in 1846, and removed to the museum in 1847; 1848, a collection of Hebrew works formed by H. J. Michael of Hamburg, 4,420 volumes, purchased. Among many rare treasures of the Grenville library may be mentioned the Mentz Latin Bible, commonly called the Mazarin Bible, by Gutenberg and Faust, about 1455, 2 vols., vellum; the first printed Psalter, in Latin, by Faust and Schöffer, 1457, being the first book printed with a date; the unique copy, on vellum, of the first edition of Livy, by Schweinheim and Pannartz, 1469 (purchased at Mr. Edwards's sale in 1815, for 860 guineas); the first edition of Ovid, by Azzoguidi; a copy of the Aldine Virgil of 1501, the first book printed in Italic type, and the earliest attempt to produce cheap books; a first Shakespeare, one of the finest known, 1623; and a beautiful series of early editions of the *Orlando furioso*.

—The collection of antiquities consists of the Egyptian and Assyrian antiquities, the former including the trophies of the Egyptian expedition of 1801; the Elgin marbles, purchased for £35,000; the Phigalian marbles, purchased for £19,000; the Townley marbles, purchased for £28,200; the marbles from Halicarnassus, brought from Budrun in Asia Minor, 1846-'58, and bass reliefs which originally belonged to the mausoleum erected by Artemisia, queen of Caria, in honor of her husband, King Mausolus; there is also a colossal statue supposed to be that of Mausolus himself, broken into 65 pieces, which have been reunited; a portion of the Farnese marbles, bought in 1864 from the ex-king of Naples for £4,000; Sir William Hamilton's collection of Greek and Etruscan vases, among which is the celebrated Portland vase, which was in 1845 broken in pieces by a lunatic, but has been wonderfully restored; Mr. Richard Payne Knight's collection of coins and medals; and many other works of ancient and modern art. Garrick (whose collection of old English plays is in the library) bequeathed to the museum a statue of Shakespeare which was executed for him by Roubiliac. The world-wide celebrity of the museum is not a little due to the remarkable array of works of art. They have contributed powerfully in facilitating and stimulating the study of the great models of antiquity, especially the Elgin marbles, which are the most perfect specimens of the art of Phidias. The most recent contributions to the department of antiquities are the collections from the ruins of Nineveh and Babylon, by Mr. Layard, Col. Rawlinson, Mr. Loftus, and Mr. Rassam.—The collection of natural history is inferior only to that of the museum in Paris. Among the curiosities is the stuffed skin and skeleton of a gorilla, nearly 6 ft. high, shot in Africa by Du Chaillu, which had before been exhibited in the United States; it is the largest known specimen of the largest species of the quadrumania. There is also a foot of the dodo, a bird now known only by a few scanty fragments, and a single picture said to have been painted from

life.—In the department of mineralogy and geology is a fine collection of meteoric stones, arranged in chronological order; the oldest, weighing 270 lbs., fell at Ensisheim in Alsace in 1492. There is a metallic block from Buenos Ayres, weighing 1,400 lbs., and a meteorite from Melbourne, Australia, weighing 7,000 lbs.—The botanical collection is very large. Its nucleus was the herbarium of Sir Hans Sloane, which consisted of about 8,000 species, bound in 262 volumes; to this in 1820 was added the magnificent herbarium of Sir Joseph Banks. It includes also the Dutch *Hortus Cliffortianus*, with descriptions by Linnaeus, and Burmann's Ceylon plants; and in 1860 was added by purchase the herbarium of Prof. Nuttall, containing 10,000 species, especially valuable from its extraordinary number of typical plants.—The government of the museum is vested in a board of trustees, 48 in number, of whom 1 is named directly by the crown, 28 are official, 9 are named by the representatives or executors of parties who have been donors to the institution, and 15 are elected. The catalogue, which is in manuscript, is drawn up on a uniform plan, and when completed will probably extend to 1,500 or 2,000 volumes. Under the galleries are book presses filled with a large library of reference for the use of readers, comprising most of the standard works on the various branches of learning, and an extensive collection of dictionaries of all languages, biographical works, encyclopædias, parliamentary histories, topographical works, &c. These books can be consulted at pleasure without the usual formalities of the ticket system. Access to the reading room may be obtained by written application to the librarian. Tickets are issued for six months, and at the expiration of this term fresh application is to be made for a renewal. No person can be admitted without a ticket, and the tickets are not transferable. All the buildings of the museum are closed between the 1st and 7th of January, the 1st and 7th of May, and the 1st and 7th of September; also on Sundays, fast days, and holidays. The whole establishment is open to public view on Mondays, Wednesdays, and Fridays, from 9 till 4 during November, December, January, and February; from 10 till 5 during March, April, September, and October; and from 10 till 6 during May, June, July, and August. The reading room is open daily, with the above exceptions, seven hours in the winter, eight hours in the spring and autumn, and nine hours in the summer. Artists are admitted to study in the galleries of sculpture between 9 A. M. and 4 P. M., every week day, except Saturdays. The print room is also closed on Saturdays.

BRITONS. See CELTS.

BRITTANY (Fr. *Bretagne*), an ancient province of France, consisting of the large triangular peninsula which, projecting into the Atlantic, forms the western extremity of that country. Washed on three sides, N., W., and S.,

by the sea, it joined on the E. the provinces of Normandy, Maine, Anjou, and Poitou. Its coast line, indented by numerous bays and harbors, was about 500 m. in length, extending from the bay of Cancale, on the confines of Normandy, to that of Bourgneuf, some 20 m. S. of the mouth of the Loire. Its greatest length from S. E. to N. W. was 185 m.; greatest breadth, 105 m.; area, 13,085 sq. m. It is now divided into the departments of Loire-Inférieure, Ile-et-Vilaine, Morbihan, Côtes-du-Nord, and Finistère. The broken hills by which the interior of the country is intersected, its narrow valleys, its partly unnavigable streams, its vast and thinly populated heaths, its old castles standing on solitary hillocks with their dismantled walls and dilapidated towers, its extensive forests so closely associated with the rites of the ancient druids, its sandy shores



Breton Peasants.

or rugged reefs, the strange garb of its herdsmen and their harsh Celtic language, all combine to stamp the region with a strange and striking character.—Originally independent and known as Armorica, Brittany was indebted for its new name to colonies from Great Britain, which settled at various periods on its territory. These emigrations can be traced as far back as the 3d century; but it is probable that the definitive change of appellation took place only about the middle of the 5th century, when numbers of British families left the island on account of the Anglo-Saxon invasion. Under Charlemagne the paramount power of the Frankish crown over Brittany increased; but its princes, availing themselves of the weakness of his successors, regained their independence, and the principal of them was acknowledged as a king by Charles the Bald. There prevailed among them something of a

feudal organization, the counts of Rennes, Nantes, and Cornouailles being the most powerful, and one of them being generally accredited as the chief of the confederation. About the middle of the 12th century Conan IV. succeeded in bringing all parts of the country under his own control, calling it the county of Brittany. His daughter and heiress Constance married Geoffrey, third son of Henry II. of England, to whom she brought the title and power of count. His son and successor Arthur was assassinated by his uncle, King John of England, when Philip Augustus tried to seize upon Brittany, as he had done with Normandy; but the Bretons resisted, and declared for Alix, a daughter of Constance by her third husband, Guy of Thouars. This Alix married Pierre de Dreux, called Mauclerc, who took the title of duke of Brittany and ruled until their eldest son became of age. This prince, John I., surnamed Rufus, born in 1217, became the head of the ducal family, which reigned until the beginning of the 16th century. On the death of John III., in 1341, his brother John of Montfort and Charles of Blois, who had married the niece of John III., contended for the possession of the duchy. This civil war lasted 24 years. Charles having been killed at Auray in 1364, the ducal crown was secured to the son of John of Montfort, who reigned under the name of John V. Francis II., who reigned from 1458 to 1488, left his daughter Anne heiress of the duchy of Brittany. She was married by proxy to Maximilian of Austria, then king of the Romans; but Anne of Beaujeu, who governed France under the name of her brother, Charles VIII., prevented the alliance from being consummated; she forced the duchess to marry the young king of France, so that Brittany was for the first time united to the kingdom (1491). On the death of Charles VIII., Louis XII. hastened to divorce his first wife, and to marry his predecessor's widow, thus securing the union between France and Brittany. But it was not till 1532, during the reign of Francis I., that Brittany was declared to be an integral part of the French kingdom. Although losing its independence, it persevered in maintaining the rights and privileges which had been secured to it by the treaty of union. The royal power was limited here by a representative government called the estates of Brittany. The assembly, the sessions of which were held every other year, consisted of the three orders, the clergy, the nobility, and the *tiers état*. The king was not allowed to lay any tax, this being regulated by the assembly, which voted for the support of the royal government what was called a gratuitous gift. The province had also its own courts of justice, the highest of which was known as the parliament of Rennes, with four seneschal jurisdictions. More than once Brittany was compelled to stand in defence of its immunities; but its people, while vindicating what they thought their rights, showed

great devotion to their French sovereign; and when the revolution occurred, the Chouans of the province fought the last battle in behalf of royalty. Brittany has never been distinguished for commerce or manufactures, but its seamen are among the boldest in the world; those of St. Malo, Brest, and Lorient are to be met in the most distant waters, more generally engaged in fishing than in trade. The province was usually divided into Western or Lower Brittany and Eastern or Upper Brittany.

BRITTON, John, an English antiquary, born at Kington St. Michael, Wiltshire, July 7, 1771, died in London, Jan. 1, 1857. He was apprenticed to a London wine merchant, with whom he remained six years. For seven years afterward he struggled with poverty, eking out a bare existence by various employments. A look on the adventures of Pizarro, which he wrote, introduced him to the publisher of the "Sporting Magazine," who employed him with another person to compile the "Beauties of Wiltshire," which appeared in 1801, and succeeded so well that the authors were employed to compile the "Beauties" of all the other counties of England, in 26 volumes. In 1805 he published the first part of the "Architectural Antiquities of England;" it was completed in 1815 in 5 vols. 4to, richly illustrated. His distinct productions, 87 in number, are valuable, not only for the information they supply, but for their numerous and beautiful engravings. He published in 1847 an "Essay on the Authorship of the Letters of Junius," in which he endeavored to prove that Junius was Col. Barré, aided by Lord Shelburne and Dunning. Then, at the age of 76, having accumulated a handsome fortune, he discontinued his labors as author. His friends, constituting the "Briton Club," entertained him at a public dinner, and subscribed over £1,000 for a testimonial to be presented to him. On his own suggestion, the money was devoted to bringing out his autobiography.

BRIVES, or **Brives-la-Gallarde**, a town of Liousin, France, in the department of Corrèze, situated in the valley of the Corrèze, 18 m. S. W. of Tulle; pop. in 1866, 10,389. Its fine appearance at a distance is not realized in its interior. The most remarkable buildings are a communal college, a hospital, a library with 21,000 volumes, and an ancient Gothic house, dating, it is said, from the time of the English occupation. The manufactures embrace woollens, muslins, silk, handkerchiefs, and cotton yarns. There are extensive bleacheries and distilleries, and a brisk trade is carried on in brandy, wine, chestnuts, cattle, and truffles, the Brives chicken and truffle pie enjoying much reputation. Cardinal Dubois and Gen. Brune were born here.

BRIXEN, a town of Tyrol, capital of a circle of the same name, 39 m. S. by E. of Innsbruck, at the confluence of the rivers Eisack and Rienz, on the railroad leading through the Brenner pass; pop. about 4,000. Its position is strategically very important, owing to the high and

steep mountains on each side. The town is spoken of as early as the 9th century. It has a Catholic gymnasium, and has been the residence of a bishop since 992. The Catholic council of 1080, which pronounced the removal of Pope Gregory VII., was held here. In the peasants' war in 1525 Brixen was occupied and sacked. In the vicinity of the town is Fort Francis, or Franzensveste, erected in 1845, commanding the valley of the Eisack, and the three roads from Bavaria, Italy, and Carinthia, which join at Brixen.

BRIXHAM, a seaport and market town of Devonshire, England, on the coast of the English channel, 23 m. S. of Exeter; pop. in 1871, 4,890. It is noted for its fisheries, which employ more than 200 vessels and 1,500 seamen. It was the landing place of William III. when he came to take possession of the English throne. A part of the stone upon which he set foot has been built into a monument, with the inscription: "On this stone, and near this spot, William prince of Orange first set foot, on his landing in England, 5th of November, 1688."

BROACH, or **Baroach**. I. A district and collectorate of Bombay, British India, extending in a narrow strip along the W. coast of the main peninsula and the E. shore of the gulf of Cambay; area, about 1,850 sq. m.; pop. estimated at 200,000. It contains, besides the capital, about 400 villages, the inhabitants of which are mostly engaged in agriculture, especially in the cultivation of cotton, large quantities of which are exported. The district was annexed to the territory of the East India company in 1781, but in 1782 the Mahrattas, who had formerly held it, were allowed to again assume the government. In 1803, with a considerable extent of other territory, it was finally ceded to the company. II. A city, capital of the district, in lat. 21° 46' N., lon. 73° 14' E., on the Nerbudda river, about 25 m. from its mouth, and 29 m. S. by W. of Baroda; pop. about 31,500. It has a few fine buildings, but in general the houses are low and unattractive in appearance. Much of the city is now in ruins, and the river filled with sand so that large vessels cannot approach the place. Broach is supposed to be the Barygaza of Ptolemy and Arrian.

BROAD RIVER, a stream of North and South Carolina, rising at the foot of the Blue Ridge, in the western part of the former state, and entering South Carolina on the line between Spartanburg and York counties. It then takes a southerly course through a rich and highly productive tract of country, covered with fields of maize and cotton, and finally unites with the Saluda to form the Congaree river. The city of Columbia is at their junction.

BROADUS, John Albert, D. D., an American clergyman, born in Culpeper co., Va., Jan. 24, 1827. He was educated at the university of Virginia, and from 1851 to 1853 was assistant professor of ancient languages there. He then

became pastor of the Baptist church in Charlottesville, and in 1859 professor of New Testament interpretation and homiletics in the Southern Baptist theological seminary at Greenville, S. C., where he still is (1873). As a Greek scholar and New Testament critic Dr. Broadus stands at the head of the Baptists of the south; but his only publication in this department as yet is an elaborate review (in the "Religious Herald," 1866 and 1868) of the American Bible Union's revised version of the New Testament. In 1870 he published a work on "The Preparation and Delivery of Sermons," which has been adopted as a text book in several theological seminaries. His other publications consist of sermons and review articles, and a series of papers ("Recollections of Travel") in the "Religious Herald," 1872-'3, describing a tour in Europe, Egypt, and Palestine.

BROCADE (Span. *brocado*, embroidered), a fabric resembling embroidered stuff, formerly much in vogue for rich dresses. It was originally made entirely of threads of gold or of silver, or of the two mixed. Ornaments of flowers and foliage were interwoven and raised above the surface of the cloth. When a cheaper material, as silk, was substituted for the metallic threads, the raised ornaments of leaves and flowers still continued to characterize the brocades. Brocades are now comparatively little in use.

BROCCHI, Giovanni Battista, an Italian mineralogist and geologist, born at Bassano, Feb. 18, 1772, died at Khartoom, Nubia, Sept. 25, 1826. In 1808 he was appointed inspector of mines, and in 1814 he published a work on the structure of the Apennine range, with an account of the fossils of its strata. He corrected the erroneous view of Brieslak, who supposed Rome to occupy the site of an extinct volcano, to which he ascribed the tufa and other volcanic materials found on the seven hills. In 1823 Brocchi received a commission from Mehemet Ali to examine Sennaar, but died from the effects of the climate.

BROCCOLI, a species of cabbage, belonging to the genus *brassica*, differing from the other species by its smaller seeds and the tendency of its flowers to press together into fleshy heads. It most nearly resembles the cauliflower, from which it differs by no very precise characteristics. The broccoli is best raised by sowing the seed in open beds and transplanting the plants once or twice. It may be produced either in spring, summer, or autumn, according to the time when the seed is sown. It has a woody stem, and may be propagated not on-



Broccoli.

ly by seed, but by cuttings of its stem. To effect the latter method, let a portion of the old stem containing an eye or a bud, after being well dried in the sun, be dibbled into the soil, and not be watered till it shows signs of growing.

BROCK, Isaac, a British general, died Oct. 13, 1812. He captured Gen. Hull and his whole force at Detroit, Aug. 16, 1812, and fell in the battle of Queenstown, Canada, on the Niagara river. During his funeral the guns of the American forts were fired as a token of respect. A monumental column was erected on the spot where he fell; this was partially destroyed during the disturbances of 1840, and has been replaced by another, 194 ft. in height, which ascended by a spiral staircase inside.

BROCKEDON, William, an English artist and inventor, born in Devonshire, Oct. 13, 1780, died in London, Aug. 29, 1854. He was the discoverer of a method by which plumbago and its dust (previously thrown away as valueless) were freed from impurities and resolidified, so as to make a superior description of lead pencils. He was the author of the "Passes of the Alps," with over 100 folio engravings from drawings by himself. He also produced "Italy, Classical and Picturesque" (folio, 1842-'8), and "Egypt and Nubia" (3 vols. folio, 1846-'9).

BROCKHAUS. I. Friedrich Arnold, founder of the publishing firm of Brockhaus in Leipsic, Germany, born at Dortmund, May 4, 1772, died in Leipsic, Aug. 20, 1823. He was educated at the gymnasium of his native town, and afterward sent into a merchant's counting-room at Düsseldorf. In 1793 he went to Leipsic, where he devoted himself for two years to the acquisition of scientific knowledge and the principal modern languages of Europe. In 1795 he established at Dortmund a mercantile house for the sale of English manufactures, which he removed to Arnheim in the Netherlands in 1801, and to Amsterdam in 1802. Although he managed his business with success in a peculiar sense, he abandoned it out of distaste for mercantile pursuits in 1804, and entered into the book trade at Amsterdam. A periodical in Dutch (*De Ster*, "The Star"), started by Brockhaus in 1806, and devoted to politics and literature, was suppressed by the government on account of its opinions on political and ecclesiastical matters. The *Amsterdamsch Acond-Journaal* ("Amsterdam Evening Journal"), which succeeded the *Ster*, did not continue long. The confusion into which Europe was thrown by the Napoleonic wars was unfavorable to literary enterprises, and after the annexation of Holland to the French empire (1810) Brockhaus returned to Germany, and opened an establishment in Altenburg (1811). In 1800 Brockhaus purchased the copyright of the German *Conversations-Lexikon*, which has been commenced in 1796. In 1809-'10 he completed the first edition by the publication of two supplementary volumes. In 1812 he be-

to publish the second edition of this work, which was finished under his own editorship. Shortly before the battle of Leipsic he commenced a political newspaper called *Deutsche Literatur*, which breathed a patriotic German spirit. This journal lasted from Oct. 14, 1813, to May, 1816. The peace of 1815 enabled him to enter upon large literary undertakings. In 1817 the business had increased to such an extent that Brockhaus removed to Leipsic, and opened a printing office to his former establishment. His *Conversations-Lexikon* ran through several editions in his lifetime, and numerous other publications of the first rank raised the firm to a high position in German literature. Among the more important publications of the firm during the lifetime of its founder may be mentioned Ebert's *Allgemeines bibliographisches Lexikon* (1821) and Von Raumer's *Geschichte des Hohenstaufen* (1823), besides several periodicals edited by himself; among these is the *Literarisches Wochenblatt*, now published as *Blätter für literarische Unterhaltung*. His liberalism brought him under the ban of the reactionary Prussian government, which in 1819 ordered a censorship upon all the publications of Brockhaus, which lasted until his death. His biography was published by one of his relatives in 1872 (2 vols.).—The firm of F. A. Brockhaus was continued by the two sons of the founder, FRIEDRICH and HEINRICH. Under their auspices the *Conversations-Lexikon* passed through five new editions (11th ed., 18 vols., 1864-'8, with a supplement in 2 vols., 1892-'3), to which several companion works were added from time to time, namely: the *Conversations-Lexikon der neuesten Zeit und Literatur* (1832-'4), the *Conversations-Lexikon der Gegenwart* (1838-'41), and the *Gegenwart* (1848-'6). In January, 1857, the firm commenced a supplementary work of this character, called *Neuere Zeit, Jahrbuch zum Conversations-Lexikon*, published in monthly and ultimately in semi-monthly parts, which is still continued. The *Systematischer Bilder-Atlas zum Conversations-Lexikon* was published between 1844 and 1851. In 1854-'6 an abridgment of the 11th edition of the *Conversations-Lexikon* appeared in 4 volumes (*Kleineres Brockhaus'sches Conversations-Lexikon*; 2d ed., 1861-'4). The *Encyclopædia Americana*, edited by Dr. Francis Lieber (Philadelphia, 1829-'33), was based upon the 7th edition of the *Conversations-Lexikon*. Among the most notable periodical publications of this firm are the continuation since 1832 of the *Allgemeine Encyclopædie der Wissenschaften und Künste*, by Ersch and Gruber; the *Pfennig-Magazin*; the *Leipziger Allgemeine Zeitung*, commenced in 1837; and the *Deutsche Allgemeine Zeitung*, since 1843. In 1850 Friedrich Brockhaus retired from business, and Heinrich for a time constituted alone the firm of F. A. Brockhaus; in 1854 and 1863 his two sons, HEINRICH EDUARD and HEINRICH RUDOLF, upon reaching respectively their 25th year, were admitted as

members of the firm. The firm of F. A. Brockhaus has printing, lithographing, binding, and type-founding establishments connected with its book-publishing and general bookselling business. II. Hermann, a German orientalist, third son of Friedrich Arnold, born in Amsterdam, Jan. 28, 1806. He studied the oriental languages at Leipsic, Göttingen, and Bonn. The languages and literature of Hindostan especially engaged his attention; for the better acquisition of this branch of knowledge he resided for a long time in Paris, London, and Oxford. In 1839 he was appointed professor extraordinary at the university of Jena, and in 1841 at Leipsic. In 1848 he was called to the chair of Sanskrit language and literature in the latter university. He has edited and published several Sanskrit and Persian works, some of them in Roman type. He was one of the founders of the German oriental society, the *Zeitschrift* issued by which he has edited since 1852. In 1856 he undertook the editing of Ersch and Gruber's *Allgemeine Encyclopædie*.

BROCKLESEY, Richard, an English physician, born of a Quaker family at Minehead, in Somersetshire, Aug. 11, 1722, died in London, Dec. 11, 1797. He studied medicine at Edinburgh, and subsequently at Leyden, where he took his doctor's degree in 1745. In 1746 he published an essay on the mortality of horned cattle. He was physician of the British forces in Germany from 1758 to 1763, and published his observations on medical hospitals on his return. In 1763, when John Wilkes was severely wounded in a duel with Mr. Martin, he was attended by Dr. Brocklesby. In 1765 he was elected fellow of the royal society, which at his suggestion founded a professorship of chemistry at the royal military academy of Woolwich. For over 40 years he was on intimate terms with the leading statesmen, authors, artists, and other persons of note in London. He attended on Dr. Johnson for many years without fee. When it was proposed that Johnson should visit the continent for a milder climate, and want of means was mentioned as a reason why the journey was to be abandoned, Brocklesby offered to settle on him £100 for life.

BROCKPORT, a village in the town of Sweden, Monroe county, N. Y., on the Erie canal and a branch of the New York Central railroad, 18 m. W. of Rochester; pop. in 1870, 2,817. It is noted for the manufacture of pumps, and contains also three manufactories of reapers and mowers, several mills, seven or eight churches, a state normal school, a national bank with \$50,000 capital, and two weekly newspapers.

BROCKVILLE, a town of Ontario, Canada, in Leeds county, on the St. Lawrence, at the foot of the Thousand Islands, 125 m. S. W. of Montreal, and 10 m. S. W. of Prescott; pop. in 1871, 10,475. It occupies a pleasant situation, and is substantially built. There are manufactures of hardware, stoves, white lead, gloves, agricultural implements, and chemicals, including

superphosphates of lime, a custom house, and telegraph offices. The Grand Trunk railway passes north of the town, and the Brockville and Ottawa railway connects it with Ottawa, 65 m. N. A ferry boat crosses the river to Morristown, N. Y., in summer; and passenger steamers and propellers call here daily.

BRODERICK, David Colbreth, an American politician, born in Washington, D. C., in December, 1818, killed in San Francisco, Sept. 21, 1859. In early life he worked as a stone mason in New York, and was connected with the fire department, of which he became engineer. In 1846 he was an unsuccessful candidate for congress. He removed to California in 1849, and in 1850 was elected to the state senate, and in 1856 to the United States senate, where he opposed the attempt to force slavery into Kansas by means of the Lecompton constitution. On account of some expressions used in debate he was challenged by David S. Terry, a judge of the California courts, and was killed in the duel which ensued.

BRODERIP, William John, an English naturalist, born at Bristol in 1787, died in 1859. He took his degree at Oriel college, Oxford, was called to the bar in 1817, edited a legal work on sewers, and published three volumes of law reports. He was appointed by Sir Robert Peel a police magistrate for a metropolitan district, which office he retained for 34 years. He contributed largely to the "Penny Cyclopædia," and the greater part of the zoological department of the "English Cyclopædia" is his work. He is the author of many essays in the "Quarterly Review" on subjects of natural history. He also wrote "Zoological Recreations" (London, 1847), and "Leaves from the Note Book of a Naturalist" (1852).

BRODHEAD, John Romeyn, an American historian, born in Philadelphia, Jan. 2, 1814, died in New York, May 6, 1873. He graduated at Rutgers college in 1831, studied law, practised for two years in New York, and afterward devoted himself to the study of American history. In 1839 he went to Holland and was attached to the United States legation at the Hague. The legislature of New York having passed an act to appoint an agent to procure and transcribe original documents referring to the history of the state, he was commissioned in 1841. The three following years were spent by him in searching the archives of Holland, England, and France for papers which might serve to illustrate the history of New York, and complete the records of the state at Albany. As the result of his labors he obtained a collection of more than 5,000 separate papers, many of them previously unknown to historians. He deposited his collection in the secretary of state's office, and made his final report as agent, in February, 1845. All these documents were ordered to be published by an act of the legislature of March 30, 1849. On the appointment of Mr. Bancroft as minister to England in 1846, Mr. Brodhead was made secretary of

legation, and remained in London till 1847. He now set to work upon his "History of the State of New York," the first volume of which containing the period under the government of the Dutch, was published in 1853, and the second in 1871. In 1853 he was appointed naval officer of the port of New York, which post he held till 1857.

BRODIE, Sir Benjamin Collins, an English surgeon, born at Winterslow, Wiltshire, June 1783, died at Betchworth, Surrey, Oct. 2, 1862. He was educated at a free school in London, and under Sir Everard Home at St. George's hospital, where he became assistant surgeon in 1808, and afterward surgeon. In 1811 he received the Copley medal of the royal society for his physiological paper in the "Philosophical Transactions." From 1819 to 1823 he was professor of anatomy in the royal college of surgeons. In 1834 he was created a baronet; and in 1837 he became sergeant surgeon to the queen. He was a member of several learned societies at home and abroad. He suggested important improvements in many kinds of surgical instruments, and in numerous cases substituted simple and less violent methods of surgical operation. He published numerous articles in the medical journals, and a series of physiological papers on the action of the nervous centres in the production of animal heat, in the "Philosophical Transactions" from 1810 to 1812. His published works, some of which have passed through several editions, are: "Pathological and Surgical Observations on Diseases of the Joints" (1818; 5th ed., 1850); "Lectures on Diseases of the Urinary Organs" (1832; 4th ed., 1849); "Physiological Researches" (1851); and "Psychological Inquiries" (1854; 3d ed., 1856).—His son, the present Sir BENJAMIN COLLINS BRODIE, born in 1817, was appointed professor of chemistry at Oxford in 1855, and was president of the chemical society in 1859 and 1860. He has contributed to the "Philosophical Transactions" and the "Journal of the Chemical Society."

BRODY, a town of East Galicia, Austria, capital of a district of the same name, 52 m. E. of Lemberg; pop. in 1869, 18,890, of whom two thirds are Jews, whence it has been called "the German Jerusalem." It is an important commercial focus for Galicia, Roumania, Turkey, Germany, and chiefly for Russia, on the frontier of which it is situated. In 1779 it was established by Austria as a free port. It is generally dirty and badly built, but has a number of fine buildings, among which are the Potocki palace, the principal synagogue, and several churches. It is the seat of an imperial administrative board for the district, and of a commercial tribunal, has a superior school for the Jews, and a gymnasium. Two great annual fairs are held, and the transactions amount to about \$20,000,000 yearly. The traffic is in grain, horses, cattle, tallow, hides, furs, leather, wax, honey, dried fruits, colonial products, ironmongery, jewelry, wines, porcelain, &c.

also has extensive tanneries and linen factories. From May 8 to Oct. 7, 1849, Brody was occupied by Russian troops. In 1859 the town was desolated by a great fire.

BRODZINSKI, Kazimierz, a Polish soldier and poet, born at Królówko in 1791, died in Dresden, Oct. 10, 1835. In 1809 he entered the military service of his country, and fought against the Austrians; in 1812 he participated in Napoleon's Russian campaign, and in 1813 in the campaign in Germany, until he was taken prisoner at the battle of Leipsic. When the university of Warsaw was established, he became professor of aesthetics and literature. He was the first who attempted to reinvigorate Polish poetry from the national sources, instead of imitating Latin and French models. He also translated many of Scott's novels into Polish, 10 vols. His complete works were published 1842-'4.

BROFFERIO, Angelo, an Italian poet and politician, born at Castelnovo, Piedmont, in 1802, died at Verbanella, on Lago Maggiore, May 1, 1866. He practised law in Turin, chiefly in criminal cases, and was at the same time an influential journalist. Having early agitated in favor of the national cause, he became the democratic leader in the chamber of deputies, where he represented Cavaglia, 1848-'53, Genoa, 1853-'60, and subsequently a small borough of southern Italy, after having lost ground by his opposition to Cavour, whom he had satirized in his *Tartufo politico*. Several of his many dramas were successful. A 5th edition of his *Canzoni* (patriotic songs in the Piedmontese dialect) appeared in 1858; and shortly before his death he composed *Inno de guerra*, a popular war hymn. He also published a history of Piedmont from 1814 to 1851 (5 vols., 1849-'52), and *I miei tempi* (10 vols., 1858-'61).

BROGLIE, or *Brogia*, the name of a family originally from Piedmont, established in France toward the middle of the 17th century. **I. François Marie**, born at Chieri, in Piedmont, in 1611. He entered the French service, in which he distinguished himself, was made governor of the Bastille, and died July 2, 1656. **II. Victor Maurice**, count de, born about 1645, distinguished himself in the army, became marshal of France, and died August 4, 1727. **III. François Marie**, the first duke de, born Jan. 11, 1671, died May 1, 1745. He was a lieutenant general and marshal. In 1725 he was appointed minister to England, and negotiated the treaty between France, England, and Prussia. He afterward became distasteful to the ministers, and was banished to his estate at Broglie, where he died. **IV. Victor François**, second duke de, born Oct. 19, 1718, died at Münster in 1804. He was a lieutenant general during the seven years' war, routed the Prussians at the battle of Berghen, was created a prince of the German Empire by Francis I., became marshal of France in 1759, and minister of war in 1789. In 1792 he led a body of French *émigrés* in the invasion

of Champagne. **V. Claude Victor**, prince de, son of the preceding, born in Paris in 1757, guillotined June 27, 1794. He was elected deputy to the states general, gave evidence of liberal opinions, and was for a while president of the constituent assembly. Subsequently he was brigadier general in the army on the Rhine. After the 10th of August, 1792, refusing to obey the decree of the legislative assembly suspending the power of the king, he was removed, and ultimately arraigned before the revolutionary tribunal, and executed. **VI. Achille Léonce Victor Charles**, duke de, son of the preceding, born in Paris, Nov. 28, 1785, died there, Jan. 25, 1870. He gained the regard of Talleyrand, who in 1814 presented his name for appointment to the chamber of peers. During the hundred days he was elected an officer in the national guards. He married at Leghorn, Feb. 15, 1816, the daughter of Mme. de Staël. After the second restoration he resumed the title of duke, instead of that of prince, previously used in the elder branch of his family. At the trial of Marshal Ney he used every effort to save his life. In 1822 he denounced the slave trade; and after the revolution of 1830 he succeeded as minister in concluding a convention on the right of search, by which he hoped to suppress that traffic. He was appointed minister of public instruction and president of the council of state, in August, 1830, but soon disagreed with his colleagues and resigned. On Oct. 11, 1832, he reentered the cabinet as minister of foreign affairs, under Marshal Soult, with Guizot and Thiers as his colleagues. Having been defeated on a question of indemnity to the United States, he retired, April 4, 1834. In 1849 he was elected to the legislative assembly by the department of Eure, and figured among the leaders of the conservative party. In 1850 he visited Louis Philippe in England. He protested against the *coup d'état* of Dec. 2, 1851, was for a short time under arrest, and afterward went to London. On his return to France in 1852, he refused to take the oath on the constitution, and tendered his resignation as a member of the council of the department of Eure. In 1856 he was made a member of the French academy, and in 1866 member of the academy of moral sciences. Three volumes of his *Écrits et Discours* were published in Paris in 1863. **VII. Albertine Ida Gustavine de Staël**, duchess de, wife of the preceding, born in 1797, died in September, 1838. She was the only daughter of Mme. de Staël, and was educated under her influence. After her marriage in 1816 with the duke de Broglie, her house in Paris became a resort of the most distinguished society. She was noted for her zeal as a Protestant, though her husband was a devout Roman Catholic. After the death of her brother, Auguste de Staël, in 1827, she prepared a complete edition of his *Œuvres diverses* (5 vols., Paris, 1829); with a notice containing interesting particulars of her mother's life. Her essays were collected after her death

(*Fragments sur divers sujets de religion et de morale*, Paris, 1840); the most remarkable of these relate to the part assigned to women in philanthropical labors and in the improvement of public morals. **VIII. Albert**, duke de, son of the preceding, a French statesman and author, born June 13, 1821. He early acquired literary reputation by his contributions to the *Revue des Deux Mondes*, and was elected in 1862 a member of the academy, in place of Lacordaire. His principal work, *L'Eglise et l'Empire romain au IV^e siècle* (2 vols., 1856), passed through many editions. He published a French version of Leibnitz's *Système religieux*, and wrote *Questions de religion et d'histoire* (2 vols., 1860), and various disquisitions, the principal feature of which was his attempt to reconcile the authority of the pope with modern views of progress. Under M. Thiers's presidency he has been for a short time minister of foreign affairs and ambassador at London (1871-2). **IX. Maurice Jean Madeleine**, bishop of Ghent, born Sept. 5, 1766, died in Paris, July 20, 1821. In 1805 he was almoner to Napoleon, became bishop of Ghent in 1807, was imprisoned at Vincennes in 1811, and restored to the see of Ghent in 1814. Refusing to take the oath of allegiance to the king and constitution of the Netherlands, he was in 1817 exiled from that kingdom, and returned to France.

BROGNI, Jean Allarmet, cardinal de, a Roman prelate, born at Brogni, Savoy, in 1842, died in Rome, Feb. 16, 1426. He was a swineherd in his youth, and was successively made bishop of Viviers and of Ostia, archbishop of Arles, and bishop of Geneva, and finally cardinal and chancellor of the church of Rome. During the great schism which divided the church for more than 40 years, Brogni devoted himself to the work of conciliation. The council of Constance being called for that purpose by John XXIII. and the emperor Sigismund, the former was deposed at the sixth session, after which Brogni presided as senior cardinal until the 41st, when Cardinal Colonna was elected pope, Nov. 14, 1417, chiefly through Brogni's influence, under the name of Martin V., and the holy see was once more established at Rome. As president of the council he had to pronounce the sentence of death upon Huss, to whom he had shown great kindness during the trial. The cardinal was the founder of the hospital of Annecy, of the college of St. Nicholas at Avignon, and other charitable institutions.

BROGUE, or **Brogan**, originally a sort of clog or shoe made of untanned skin, and worn by the Irish and Scotch. This article of dress fell into disuse early in the 15th century, and the substitute was made of tanned leather, with thick soles, freely studded with large-headed nails, which took the name of the article they supplanted. These brogues or brogans continue to be worn in Ireland. By a natural process the peculiar manner in which the wearers of the brogue pronounced the English language became universally known as the brogue, and

the application of this term is limited almost exclusively to the Irish.

BROHAN. I. Augustine Suzanne, a French actress, born in Paris, Jan. 29, 1807. She was educated at the Paris conservatory, where in 1821 she obtained the first prize for proficiency in comedy. She made her first appearance on the Parisian stage at the Théâtre Français in 1822 and during the next 18 years acted at the theatre, the Odéon, and the Vaudeville, identifying herself chiefly with the last named. In 1842, when at the height of her reputation, she retired from the stage. Her personations were noted for acuteness, vigor, and an unusual command of the conventional stage resources.

Joséphine Félicité Augustine, a French actress, sister of the preceding, born in Paris, Dec. 1824. She was educated at the conservatory and like her sister gained at 14 years of age the first prize for comedy. Being of a devoted turn of mind, she almost immediately afterward entered a convent, and was with great difficulty persuaded to make her début on the stage. She first appeared at the Théâtre Français in 1828, as Dorine in Molière's *Tartuffe*, and created a favorable impression by her grace, vivacity, and modesty. She was once engaged at this theatre, and soon became a skilful interpreter of Molière, excelling in such parts as Dorine, Toinette in the *Malcade imaginaire*, Cléanthis in *Amphitryon*, and Suzanne in Beaumarchais's *Mariage de Figaro*. She has also acted in many modern pieces, including Hugo's *Le roi s'amuse* and Dumas's *Mlle. de Belle-Isle*. A few slight pieces of her own have been successful on the stage, and she has figured occasionally as a journalist; but her attacks in the *Figaro* on her old friend Victor Hugo aroused so much feeling against her that she relinquished journalism. After the death of Rachel she succeeded to her chair at the conservatory. **III. Émile Madeleine**, a French actress, sister of the preceding, born in Paris, Oct. 21, 1833. She was educated at the conservatory, where she gained the prize for comedy, and at 17 made her début at the Théâtre Français. She soon became a favorite, being less noted for her personal charms than for her vivacity and intelligence as an actress, particularly in the modern drama. In 1854 she was married to Mario Uchard, a dramatic author.

BROKE, Sir Philip Bowes Vere, a British admiral, born Sept. 9, 1776, died in Suffolk, England, 1841. He was educated at the royal academy in Portsmouth, entered the navy in 1793, served in the wars between France and England, and was in command of the Shannon protecting the whale fishery in the Greenland seas, when in 1812 war was declared between the United States and Great Britain. He was dispatched with a squadron to blockade the American ports, he appeared with the Shannon in the harbor of Boston, immediately after Captain Lawrence had been promoted to the command of the Chesapeake. He sent a letter to Lord Pembroke, challenging him to an engagement. T

ter, however, deeming his appearance a challenge, had ordered the Chesapeake to lift her anchors before the letter reached its destination. The Chesapeake was badly manned, equipped, and officered, the crew being to a large extent foreign mercenaries murmuring about their size money, the ship being one of the worst in the navy, the first lieutenant being sick on shore, and the posts of two others being filled by shipmen. The action began June 1, 1813, 5 h. 45 m. P. M., in sight of the shore lined with spectators; and within 15 minutes Lawrence was mortally wounded and his ship in the possession of the enemy. For this victory Capt. Broke was made a baronet and knight commander of the bath.

BROKEN WIND, a disease of the lungs of the horse, incapacitating him from all violent and rapid exertion. It is immediately recognizable by the manner of breathing. The inspiration is performed in somewhat less than the natural time, but with an increased degree of labor; the expiration is accomplished by a double effort, in the first of which the usual set of muscles operate, and in the other the auxiliary muscles, particularly the abdominal, are put to the stretch, to complete the expulsion more perfectly; and that being done, the flank falls, the abdominal muscles relax with a kind of jerk or spasm. Broken wind is preceded and accompanied by a characteristic cough, seemingly cut short, grunting, and followed by heezing. The disease is believed to be hereditary, and in some degree consequent on malformation, on a narrow chest, a fragile membrane, and a predisposition to inflammatory diseases. Horses which are greedy feeders, and distend the stomach with large quantities of innutritious food, of which they do not readily get rid, are peculiarly liable to broken wind; which may also be produced by giving a horse a severe gallop on a full stomach, even where there may have been no previous chronic affections. When a horse is once thoroughly broken-winded, there is no cure, the structure of the lungs being permanently injured. The food should be the most nutritious, and that which will lie in the smallest compass—good oats, little hay, no chaff. Green food is particularly beneficial, and carrots appear to have a direct effect on the respiratory organs.

BROMBERG (Pol. *Bydgoszcz*), a city of Prussia, capital of an administrative district of the same name in the province of Posen, on the river Brahe, 6 m. from its confluence with the Vistula, and 69 m. N. E. of Posen; pop. in 1871, 27,734. It has a gymnasium and normal schools, several manufactories of linen and woollen stuffs, leather, sugar, chicory, Prussian blue, &c. There are a Protestant and two Roman Catholic churches, two convents, and a synagogue. It is connected by railroad with Berlin, Posen, and other cities. The Bromberg canal unites the rivers Brahe and Netze, and opens water communication between the Vistula and the Oder and Elbe.

BROME, a S. W. county of Quebec, Canada, bounded S. by Vermont and E. by Lake Memphremagog; area about 850 sq. m.; pop. in 1871, 13,757. It is traversed from north to south by spurs of the Green mountains. Lake Brome, one of the sources of the Yamaska river, is situated near its northern border. Capital, Knowlton.

BROME, Richard, an English dramatist, died in 1652. He was originally a servant to Ben Jonson. The "Northern Lass," the first of 15 comedies which he wrote, obtained Jonson's commendation. Brome joined with Thomas Heywood in writing the "Lancashire Witches" and two other plays. Soon after his death his plays were collected and published by ALEXANDER BROME (born 1620, died 1666), who, though a namesake, was no relation, and wrote satirical songs and epigrams on the loyalist side during the protectorate, as well as a comedy and a translation of Horace.

BROMIDES, salts of bromine with various radicals, of which the most important are those found with potassium, sodium, ammonium, lithium, iron, and mercury. The alkaline bromides crystallize in cubes or rectangular prisms, and are very soluble in water. These are considerably used in medicine. Bromide of potassium in large doses (20 to 60 grains) produces sleep, as has been supposed, by giving rise to anæmia of the brain. The reflex excitability of the nervous centres in general, and the spinal cord in particular, is much diminished, and in frogs may be destroyed before the power of voluntary motion is lost. They are used to relieve sleeplessness and nervous excitability, and in various diseases characterized by increased reflex activity, of which epilepsy is the most important. This disease is often controlled, and seems sometimes to be cured, by the continued use of bromides. They have also a sedative effect on the genital organs. The bromides have been used as alteratives.

BROMINE (Gr. *βρῶμος*, a stench), a chemical element discovered by Balard in 1826 in the bitter or mother liquor of the salt works of Montpellier, France, and so named in consequence of its disagreeable odor. The fact that chlorine water, when added to the lye from fucus ashes, after the addition of starch paste, gave besides the usual blue color an orange-yellow zone at the top of the liquid, was the immediate occasion of Balard's discovery. Since the announcement of the discovery, many chemists have occupied themselves with investigating the occurrence, properties, and uses of bromine, and it has now attained a position of the first importance in medicine and the arts. Bromine has been found in the mineral kingdom in combination with silver and zinc, and in the salt deposits of Stassfurt; it has also been detected in urine, coal beds, Chili saltpetre, and fucus ashes. According to Von Bibra, the amount of bromine in the Atlantic ocean is 24 grains per gallon; in the Dead sea, examined by Herapath, 121.5 grains; in the dried residue

of the Mediterranean, 1.15 per cent. In the mineral springs of Kreuznach Ure found 10.8 grains; in Kissingen water, determined by Kastner, there is 0.44 grain; in Tenbury, Worcestershire, examined by Ure, as much as 12.5 grains; and at Arnstadt, according to Hartung, 13.6 grains. In the United States, bromine has been detected in various saline springs, for the first time in the brines of Onondaga in 1830, by Hayes and Silliman. The quantity in one of the artesian wells of Saratoga, determined by Dr. Chandler, is 3.63 grains; in the brine of Saginaw valley Dr. Chilton found 7.65 grains; at Tarentum, Penn., 6 grains; in the Salina brine, analyzed by Dr. Goessmann, 1.36 grain per gallon is reported. Many mineral waters in all parts of the world have been shown to contain bromine, and for a long time the chief commercial supply was from these sources. Since the opening of the Stassfurt salt mines the chief product is derived from this source. As much as 800 grains per gallon has been obtained from the mother liquors of Stassfurt. Only two or three of the manufactories at this place have economized this substance, as the unprecedented supply has reduced the price below profitable manufacture; the decrease in price has also been hastened by the large production in the United States. At Tarentum, Sligo, and Natrona in western Pennsylvania, at Pomeroy, Ohio, and at Kanawha, West Virginia, the manufacture of bromine has become of considerable importance. The production in 1870 was 126,000 lbs. In 1867 the production at Stassfurt was 20,000 lbs. The cost in the United States in 1870 was \$1.50 a pound.—The preparation of bromine is conducted, according to Professor Miller, in the following manner: The mother liquor from the brine, after all the salts separable by crystallization have been removed, is subjected to a current of chlorine, care being taken to avoid an excess of this gas, which would occasion inconvenience by forming a compound with the liberated bromine. All the bromides are readily decomposed by chlorine, the attractions of chlorine being more powerful than those of bromine. In the foregoing operation chloride of magnesium is formed, and bromine is set free: $\text{MgBr}_2 + \text{Cl}_2 = \text{MgCl}_2 + \text{Br}_2$; the bromine shows itself by giving to the liquid a beautiful and characteristic yellow color. This yellow liquid, when agitated with ether, parts with its bromine, which is dissolved by the ether. If the mixture is allowed to stand in a glass globe closed at the bottom, the ether rises to the surface, where it forms a beautiful golden yellow layer. The mother liquor is drawn off by opening the stopcock, and the ethereal solution is agitated with a solution of hydrate of potash; the yellow color immediately disappears; bromide and bromate of potassium are formed and dissolved in the water: $3\text{Br}_2 + 6\text{KHO} = \text{KBrO}_3 + 5\text{KBr} + 3\text{H}_2\text{O}$; while the ether, after repose, rises again to the surface despoiled of its bromine, and may again be

employed in a repetition of the process upon a fresh quantity of bitters. When the solution of potash has, by repeated charges of bromine, been nearly neutralized, the liquid is evaporated to dryness; the saline mass is gently ignited, to decompose the bromate; after which it is mixed with peroxide of manganese, and distilled in a retort with sulphuric acid. Dense red vapors of bromine pass over, which may be collected in a receiver containing water, and kept cool by ice. The decomposition is of the same nature as that attending the liberation of chlorine from sea salt by means of oxide of manganese and sulphuric acid: $2\text{KBr} + \text{MnO}_2 + 2\text{H}_2\text{SO}_4 = \text{K}_2\text{SO}_4 + \text{MnSO}_4 + 2\text{H}_2\text{O} + \text{Br}_2$. In this operation a small quantity of chlorine passes over with the bromine, since, from the manner in which the bromide of potassium is formed, it is always contaminated with a portion of chloride of potassium. The chlorine unites with part of the bromine, forming chloride of bromine, which is partially decomposed and dissolved by the water in the receiver, while the bromine is condensed in red drops. In order to obtain bromine free from chlorine, it must be saturated with hydrate of baryta, which produces a mixture of bromide and chloride with bromate of barium; this mixture must be heated to redness in order to convert the bromate into bromide of barium, and the residue digested in alcohol, which dissolves nothing but the bromide; the bromide of barium is obtained by evaporation of its alcoholic solution, and when heated with black oxide of manganese and sulphuric acid, it yields pure bromine.—Bromine forms a red liquid, so deep in color as to be nearly opaque. It has a specific gravity of 2.966 at 60°; it is very volatile, and emits dense red vapors resembling peroxide of nitrogen in color. It resembles chlorine in smell, and is extremely irritating to the nose and fauces when respired, even if largely diluted with air. When swallowed it operates as a powerfully irritating poison; it acts rapidly on all the organic tissues, and renders the skin permanently yellow. Bromine boils at 145.4° F., and when exposed to a temperature of 9.5° it forms a red crystalline solid. The properties of bromine greatly resemble those of chlorine, though they are less strongly developed. It bleaches many vegetable colors. Its vapor will not support the flame of a burning taper. Bromine is slightly soluble in water, and gives to it a yellow color; it also forms with it a hydrate ($\text{Br}_5\text{H}_2\text{O}$) which crystallizes in octahedra at 32° F. This aqueous solution of bromine is decomposed by sunlight into hydrobromic acid and oxygen. Alcohol dissolves bromine freely, and ether does so still more abundantly. Olefiant gas is rapidly absorbed by liquid bromine, and a liquid compound ($\text{C}_2\text{H}_4\text{Br}_2$), bichromide of ethylene, is formed. Bromine combines directly with phosphorus, and with many of the metals, forming compounds termed bromides, the act of combination being often attended with ignition, a

case of antimony and of tin; even gold combines with it, though slowly; its compound with silver furnishes a material of considerable value in photographic operations. Bromine resembles chlorine in its power of combining with hydrogen and forming with it a very powerful acid. The oxyacids of bromine, with the exception of bromic acid, nearly known, and this compound even has never been obtained in the form of anhydride. Bromide of nitrogen is an oily-looking liquid, resembling chloride of nitrogen in its explosive properties. Bromine is employed in the manufacture of aniline colors, and its compounds are extensively used in medicine and photography. Bromoform, analogous to chloroform, has been prepared by chemists, and used to a slight extent as an anæsthetic. The hydrate of bromal has also been experimented on as a hypnotic.

BROMLEY, a market town and parish of England, in the county of Kent, 10 m. S. E. of London; pop. in 1871, 5,924. It consists chiefly of one long and neatly built street, contains many good houses, a well endowed school, a handsome college, founded by Bishop Werner in 1666 for the residence and support of 40 beggars' widows, and a Gothic church, containing the tomb of Dr. Johnson's wife.

BROMME. I. **Trangett**, a German traveller and bookseller, born at Anger, near Leipsic, in 1802, died Dec. 4, 1865. He settled in the United States in 1820, travelled extensively in Texas and Mexico, cruised in the West Indies as surgeon of a Colombian war schooner, and was detained at Hayti for a year as prisoner, but with permission to explore the island. Released and indemnified by the Colombian government, he returned to Germany, where he became a partner in Walther's publishing house at Dresden, and wrote a number of books on his travels in the new world. His *Hand- und Reisebuch für Auswanderer nach Nord-, Mittel- und Süd-Amerika*, has passed through many editions. Transferring his establishment to Stuttgart in 1844, he continued to devote his attention, though not exclusively, to the same class of publications. II. **Karl Rudolf**, brother of the preceding, born at Anger in 1804, died at St. Magnus, near Bremen, Jan. 9, 1860. He acquired distinction as a naval engineer, and having explored the greater part of the old and the new world, and made some new inventions and improvements in naval batteries, received an appointment in the Greek navy in 1827, as first lieutenant. He was eventually promoted to the command of a corvette and despatched to Candia to escort the Christian fugitives back to Greece. He projected the establishment of a naval academy, which was joined to the royal military academy, and both institutions were placed under his direction. In 1848 he was summoned to Frankfort to take part in the organization of the projected German fleet, and was appointed rear admiral of the German navy. After the dissolu-

tion of the fleet he engaged in writing his memoirs. In 1857 he accepted employment in the Austrian service, as engineer-in-chief in the navy, at Milan. He wrote several nautical and mathematical works in German, French, and English; also, under the *nom de plume* of C. K. Termo, *Skizzen aus dem Leben eines Seemanns* (1882).

BROMOFORM, CHBr_3 , a chemical compound analogous to chloroform, in which 3 atoms of hydrogen are replaced by 3 atoms of bromine. It is a colorless liquid, sp. gr. 2.18, with an agreeable odor and sweetish taste. It possesses anæsthetic properties, but cannot be recommended for that purpose as a substitute for chloroform. It is produced by the simultaneous action of bromine and caustic potash on wood-spirit, alcohol, or acetone.

BROMSGROVE, a town of Worcestershire, England, 12 m. S. S. W. of Birmingham; pop. in 1871, 13,739. It is situated in a highly cultivated valley, on the river Salwarp, near the Birmingham and Worcester canal. The principal church has a fine tower and spire, and contains many ancient monuments of the Talbot-Shrewsbury family; an inscription from one of them, erected to the memory of the great Lord Talbot, who died in 1453, and his two wives, was in 1871 given in evidence in the great Shrewsbury case. The town contains several places of worship and a free grammar school. Nails, buttons, and needles are manufactured here; and in the adjoining parish of Stoke Prior are famous salt and alkali works. In the reign of Edward II., when the linen trade was extensive, the town returned two members to parliament; but on the decline of that trade, the inhabitants asked to be relieved from representation in parliament.

BRONCHI (Gr. *βρόγχος*, the windpipe), the two main branches into which the trachea divides, at the upper part of the chest, in passing to the lungs. They are nearly cylindrical tubes composed of a series of cartilaginous rings, connected with each other by a strong fibro-elastic membrane and lined by a continuation of the mucous membrane of the trachea. The cartilaginous rings serve to keep the bronchi open and pervious for the passage of the air in inspiration. Immediately before entering the lungs each of the bronchi divides, the right into three branches, the left into two, corresponding with the number of lobes of the right and left lung respectively. These branches themselves afterward divide and subdivide in the interior of the lungs, forming the "bronchial tubes," which finally convey the air to the pulmonary lobules and air vesicles.

BRONCHITIS, an inflammatory affection of the mucous membrane lining the bronchial tubes. As it ordinarily occurs, this disease is limited to the larger bronchial tubes, the inflammation often not extending beyond the primary bronchi and the divisions of these which are situated exterior to the lungs. The inflammation may be either acute, subacute, or

chronic. By German and French writers, inflammation here, as in other mucous membranes, is called catarrh. The term bronchial catarrh means neither more nor less than inflammation of the bronchial mucous membrane, or bronchitis. Acute or subacute bronchitis is the affection popularly known as a cold in the chest. It is generally preceded by an inflammation of the mucous membrane lining the nostrils (coryza), and not infrequently by inflammation of the pharynx (pharyngitis) and of the larynx (laryngitis). In a certain proportion of cases, however, the inflammation attacks the bronchial membrane without affecting the parts situated above. The extension of inflammation from the mucous membrane above the bronchial tubes to the latter may often be prevented by an opiate at bedtime, followed by a hot, stimulating drink to excite free perspiration. The Russian or Turkish bath, also, seems sometimes under these circumstances to prevent the supervention of bronchitis. In acute bronchitis the inflammation, limited to the larger tubes, gives rise at first to a dry cough, which is especially excited by breathing cold air, and by taking a deep inspiration. The cough is usually loud and sonorous. There is a sense of soreness and of constriction on coughing, felt beneath the sternum or breast bone. The expectoration at first is small, viscid, and not infrequently streaked with blood. There is little or no embarrassment in breathing; the patient does not suffer from a sense of the want of air, and the respirations are little if at all increased in frequency. There is only slight fever, as denoted by the pulse and the thermometer in the armpit. The lassitude and debility are often not sufficient to lead the patient to take to the bed. Chilly sensations followed by flashes of heat occur, and the appetite is more or less impaired. In from two to four days the expectoration becomes more or less abundant; and it now consists of solid masses (sputa) of a yellowish or greenish color. The acts of expectoration are easier. The cough is said to be loose. The substernal soreness and constriction diminish; and the fever, together with other evidences of constitutional disturbance, gradually disappears. The duration of the affection is from six to twelve days. The symptoms are essentially similar in acute and subacute bronchitis, except that in the latter they are less marked. Subacute bronchitis occasions so little local and general disturbance as rarely to lead persons to remain within doors.—In acute bronchitis it is prudent, if not necessary, for patients to keep within doors; and confinement to the bed for a few days is sometimes judicious. A saline purgative is often serviceable. Moderate counter-irritation to the chest, as by the application of mustard, is useful. Anodynes to allay cough, and remedies promoting gentle perspiration, afford relief, and hasten the progress toward recovery. The Russian bath, if available, may be resorted to with advantage;

and the inhalation of warm vapor promotes expectoration and affords relief. After infancy an ordinary bronchitis is never of itself dangerous. If it prove a serious affection, it is in consequence of its occurrence in connection with other and graver diseases, or in persons enfeebled by age or other causes. In such cases, the danger connected with the bronchitis relates chiefly to the inability to expel the mucus from the bronchial tubes by coughing. If the efforts for expectoration are ineffectual from any cause, the inflammatory products may accumulate within the tubes sufficiently to obstruct the free passage of air to the air cells, and consequently to destroy life by interference with the function of respiration. In early infancy it is sometimes a grave affection in consequence of a greater liability to obstruction of the bronchial tubes, and the occurrence of collapse of pulmonary lobules as a result of the obstruction. These effects are more liable to occur in infants, on account of their feebleness and the want of voluntary efforts to expectorate.—Bronchitis, excepting where it is secondary to some other pulmonary disease, belongs in the class of affections called symmetrical; that is, the bronchial tubes in each side of the chest are equally affected. It is, in other words, a bilateral disease. As implied in the popular name, "a cold," it is generally attributed to exposure to atmospherical changes of temperature. In certain cases it seems clearly to be thus produced. A continued current of air upon a portion of the body is especially apt to produce it. From its frequent occurrence, however, when it cannot be traced to exposure to cold, and from the fact that a considerable number of persons are often affected simultaneously, the disease not prevailing sufficiently to be called an epidemic, it may be reasonably inferred that the causation involves the presence in the atmosphere of some morbid agency not yet ascertained.—Owing to a peculiar susceptibility of the mucous membrane of the air passages constituting a curious idiosyncrasy, some persons are affected by bronchitis, often associated with asthma, during the summer season; the cause being evidently vegetable emanations in the atmosphere, as these persons escape a attack on going to sea or to places where there is little or no vegetation. As thus produced the affection is known as hay bronchitis, hay asthma, and hay fever. The emanations are, however by no means derived exclusively from hay. The powder of ipecacuanha, emanations from feathers, &c., give rise to bronchitis, usually accompanied with asthma; in some persons irritating gases or vapors when inhaled are traumatic causes. It is an important fact that the liability to "take cold" is as a rule less in proportion as the habits involve out-of-door life.—In medical practice, ordinary bronchitis is to be discriminated from other inflammatory affections giving rise to cough and expectoration, with fever and other symptoms denoting constitutional disturbance. With refer-

ance to this discrimination, in addition to points of contrast relating to the symptoms, the physical signs obtained by auscultation and percussion are to be taken into account. In general terms, the diagnosis rests on the absence of the signs which belong to the clinical history of other affections with which this is liable to be confounded. In ordinary bronchitis, the resonance or percussion is normal; the murmur of respiration may be weakened, but it is not otherwise altered; the vocal signs are the same as in health. In short, the only signs belonging to the disease are the dry and moist bronchial rales, and these are often wanting. Physical exploration of the chest is important as enabling the physician to determine that other affections are not present, the diagnosis being thus reached "by way of exclusion."—In chronic bronchitis the inflammation is subacute, and more or less persisting. The duration is extremely indefinite; the disease may continue for months or years, and in some cases it becomes permanent, lasting until the end of life. The cough varies much in different cases as regards frequency and violence. The matter of expectoration also varies much in quantity and character, sometimes consisting of small, solid pellets raised with difficulty, sometimes being mucopurulent or consisting chiefly of pus, and accompanied sometimes with a serous liquid in abundance. The last named character is distinguished as *bronchorrhœa*. Not infrequently the sputa are streaked with blood. The constitutional symptoms are slight or wanting. Symptomatic fever is rare; the appetite and digestion are often excellent; there is either but little emaciation, or the nutrition may be well maintained, and the muscular strength is but little impaired. The affection is thus not incompatible with fair or even good general health. The causes of chronic bronchitis are obscure, except where it occurs in connection with those valvular lesions of the heart which occasion obstruction to the return of blood to this organ from the lungs. This obstruction involves a pulmonary congestion which tends to maintain, if not to originate, subacute bronchial inflammation. Bronchorrhœa is apt to occur in these cases, and the transudation of serum affords some relief of the pulmonary congestion. With or without this causative connection, an abundant bronchial expectoration, having existed for a long period, becomes sometimes, as were, an element of health, patients suffering from a sense of oppression when from any cause the expectoration is notably diminished. It follows from the statements just made, that chronic inflammation of the bronchial tubes is not usually in itself a serious affection. It may however lead to more or less impairment of health, diminishing the ability to resist or recuperate from other and graver diseases. It may even prove the immediate cause of death when, from the feebleness incident to old age or some coexisting grave disease, the ability to expectorate is impaired. Under these circum-

stances, the accumulation which takes place in the bronchial tubes may be sufficient to cause suffocation. Moreover, it proves in some cases remotely serious by leading to other pulmonary affections, namely, emphysema, or dilatation of the air vesicles, and asthma. Chronic bronchitis generally enters into the causation of these two affections. As a compensation, in leading to these affections, it antagonizes another affection of a much graver character, namely, phthisis or consumption. To the latter affection it does not tend even in the cases in which emphysema and asthma do not become developed. Chronic bronchitis is to be differentiated, in medical practice, from phthisis or consumption. In making this discrimination, the physician relies chiefly on the absence of the symptoms and physical signs which should be found if phthisis or consumption existed; that is, he reasons "by way of exclusion."—There are certain remedies which are useful, and sometimes curative, in chronic bronchitis. The iodide of potassium, the muriate of ammonia, the bromides, and balsam of copaiba are remedies, the utility and sometimes the curative power of which experience has established. A sea voyage in warm latitudes may prove signally beneficial, and may effect a cure. Patients residing in a changeable, cold climate, may derive benefit, and perhaps recover, by removing to one more uniform and genial. The cough is sometimes relieved, expectoration facilitated, and permanent improvement effected, by the inhalation of vapor or spray formed from medicated liquids.—The fact that bronchitis is one of the symmetrical diseases has been stated. This is a law of the disease when it is not secondary to some other pulmonary affection. Exceptions to this law obtain when the bronchitis takes place in the course of pneumonia and tuberculous disease of the lungs. Its occurrence as secondary to these affections is quite constant, and under these circumstances the bronchial inflammation may be more or less limited in extent, and confined to one side, that is, unilateral. The disease is then distinguished as "circumscribed bronchitis."—*Capillary Bronchitis*. This is an important variety of the disease produced by an extension of the inflammation from the large bronchial tubes to those of smaller size. It is attended with great danger to life; indeed, in a large proportion of cases, it ends fatally. The danger consists in the obstruction incident to inflammation of the tubes of small size, and caused by the swelling of the inflamed membrane and the presence of mucus. The danger is greater than in pneumonia, which may for the time render useless one half of the pulmonary organs. The interference with the function of respiration is greater in the so-called capillary bronchitis, because this, like ordinary bronchitis, affects equally both sides; that is, it is bilateral, and hence the respiratory function is compromised more than when an entire lung is rendered useless. Death takes place

by suffocation or apnoea. Happily, the affection is rare. It is limited in its occurrence chiefly to children and aged persons. Its duration in fatal cases is from twelve hours to five days. The symptoms denote an affection compromising notably the respiratory function. The respirations are rapid, in children sometimes being from 60 to 70 per minute. The action of the heart is accelerated. Lividity of the lips and face becomes marked in fatal cases. The suffering from a sense of the want of breath, or dyspnoea, is intense. The physical signs enable the physician to discriminate this affection from other affections involving, like this, notable disturbance of respiration. Over both sides of the chest there is found the auscultatory sign of the presence of liquid in the small bronchial tubes, namely, the subcrepitant rale; and with the presence of this sign there are absent the signs representing the morbid physical conditions which belong to the several affections from which this is to be differentiated, pneumonia and pleurisy with effusions being the most prominent of these.—In cases of capillary bronchitis, bloodletting may be resorted to with advantage, if it be not contraindicated by the feebleness of the patient. With the same qualification, emetics are indicated in young children, with a view to promote expectoration. Revulsive applications (sinapisms or stimulating liniments) to the chest are to be employed, together with poultices or the water dressing and an oiled muslin or silk jacket. If available, the inhalation of oxygen gas should be resorted to. Breathing warm vapor facilitates expectoration, and hastens the resolution of the inflammation. Finally, the strength of the patient is to be supported by nourishment and alcoholic stimulants.—*Influenza*. Thus far bronchitis has been considered as a sporadic disease. An epidemic affection commonly known, in different countries as influenza, and by French writers as *la grippe*, is characterized by bronchial inflammation. Its occurrence from time to time has been noted by medical writers for several centuries. It is an epidemic remarkable for its extensive and rapid diffusion, sometimes extending within a brief period over many different and widely separated countries. Influenza differs from ordinary acute bronchitis in the frequent extension of the inflammation to the frontal and maxillary sinuses, the lachrymal ducts and conjunctiva, and the Eustachian tube; but more especially it differs in a greater amount of constitutional disturbance. It is, in fact, to be regarded as a general or constitutional disease, of which the bronchitis is the local manifestation. Like all epidemic diseases, this has doubtless a special cause, and this cause undoubtedly is in the atmosphere. The special cause, however, is independent of appreciable atmospheric changes. Of the nature, source, and mode of diffusion of the cause we have no positive knowledge; but we are equally ignorant of the special causes of many, and indeed of most epi-

demio diseases. That these diseases depend on organic entities is a supposition which at the present time many regard with favor; but this remains to be proved or disproved by further researches. During some epidemics of influenza, a vast number of persons are simultaneously affected. Generally the affection is mild, but it occasions some fatality among the aged and feeble. The fatality, however, is in general due to complications which occur, and of these capillary bronchitis and pneumonia are especially apt to cause death.—*Diphtheritic Bronchitis*. A variety of bronchitis is characterized by a fibrinous exudation, or a deposit of lymph on the inflamed mucous surface, forming what is known as a false membrane. This is called bronchitis with fibrinous exudation, or pseudo-membranous or diphtheritic bronchitis. It occurs in a certain proportion of cases of diphtheria, and also of the affection known as pseudo-membranous laryngo-trachitis or true croup. Irrespective of these pathological connections, it constitutes a very rare variety of bronchitis. The fibrinous exudation or false membrane may extend to a greater or less distance along the bronchial tubes. It is sometimes expectorated entire, presenting complete casts of the bronchial subdivisions from which it was thrown off. A specimen in the museum of the Bellevue hospital medical college, presented by Dr. Stephen Rogers of New York, shows solid casts, composed of concentric layers of fibrine, formed in the bronchial tubes of an entire lobe, extending to those of minute size. The patient from whom this specimen was obtained repeatedly expectorated casts of the same description. Occurring in adults, independently of diphtheria or membranous laryngitis, this variety of bronchitis rarely destroys life. The presence of the exudation cannot be determined prior to its appearance in the matter of expectoration. When the character of the disease is ascertained, the indications for treatment do not differ materially from those in ordinary bronchitis; but the inhalation of warm vapor or spray is useful as a means of promoting the separation and expectoration of the false membrane.

BRÖNDSTED, Peder Oluf, a Danish archaeologist, born near Horsens, Jutland, Nov. 17, 1780, died in Copenhagen, June 26, 1842. He explored Greece in 1810 in company with other savants, and was appointed in 1813 professor at the Copenhagen university, and in 1818 agent of his government at Rome. He afterward explored Sicily and the Ionian islands, and after his return to Copenhagen in 1832 officiated as director of the royal cabinet of antiquities, as professor, and lastly as rector of the university. He left many writings, mostly in German, prominent among which are: *Beiträge zur dänischen Geschichte aus nordfranzösischen Manuscripten des Mittelalters* (Copenhagen, 1817-'18); *Untersuchungen in Griechenland* (Paris, 1826-'30); *Denkwürdigkeiten aus Griechenland* (Paris, 1833).

BRONGNIART. I. Alexandre Théodore, a French architect, born in Paris, Feb. 15, 1789, died June 6, 1815. He was the son of an apothecary, and at first studied medicine, but afterward became a pupil of Boullée, a noted architect of the day, whom he soon surpassed. He constructed many public and private edifices, designed and laid out the park of Mauvais, and made numerous designs for ornaments, vases, and furniture. Toward the end of his career he was appointed architect of the church and of Père-la-Chaise. **II. Antoine Louis**, a French chemist, brother of the preceding, died in Paris, Feb. 24, 1804. He was apothecary to Louis XVI., professor at the college of pharmacy, afterward professor of chemistry and the arts, and the colleague of Fourcroy at the lyceum of the republic, and also at *jardin des plantes*. During a portion of the revolutionary period he was apothecary to the army. He wrote much in the journals of science, and published some important papers on chemistry; among others, *Tableau analytique des combinaisons et des décompositions de différentes substances* (Paris, 1778). **III. Alexandre Brongniart**, a French chemist and geologist, son of the preceding architect, born in Paris, Feb. 5, 1770, died in October, 1847. He was early trained in scientific pursuits, and at the age of 20 was employed in studying the best means of improving the art of enamelling. He was afterward engaged in the medical department of the army, and in 1800 was appointed director of the manufactory of porcelain at Sèvres. In 1807 he published a treatise on mineralogy, which became a standard work. He was also appointed professor of mineralogy at the *jardin des plantes*. He undertook the classification of reptiles, described the trilobites, and assisted in the study of the fossil remains of extinct types, by exploring the geological formation of Montmartre and its fossil treasures; his joint labors being published in the celebrated *Description géologique des environs de Paris*. He travelled over the northern and southern parts of Europe, and was the first to describe the world, in his *Tableau des terrains qui recouvrent l'écorce du globe* (Paris, 1829), an accurate chronological account of the different superficial strata of the earth's crust. He was elected member of the academy of sciences in 1815, and was connected with the progress of the physical sciences in nearly all their branches during 40 years. In 1845 he published *Traité des arts céramiques*, which is deemed the best work of the kind ever written. **IV. Adolphe Brongniart**, a French botanist, son of the preceding, born in Paris, Jan. 14, 1801. He first studied medicine, and received his diploma in 1826, but afterward turned his attention to the physiology of plants and antediluvian phytology. In 1834 he was elected a member of the academy of sciences, as successor to Desfontaines; and in 1839 professor of botany at the museum of natural history in Paris. His researches have been various, and his writings

on fossil vegetables and other branches of his favorite science are numerous.

BRONNER, Johann Philipp, a German writer on wines, born at Neckargemünd, near Heidelberg, in 1792, died at Wiesloch, Dec. 4, 1865. He studied pharmacy, and in 1816 became an apothecary at Wiesbaden, where he devoted himself to the natural sciences and the culture of the vine. In 1831 he established a school for instruction in viniculture. Subsequently, under a commission from the government of Baden, he travelled through Switzerland, Italy, Tyrol, Austria, Moravia, Hungary, Styria, and Bavaria, to investigate this branch of agriculture. Between 1830 and 1857 he published 14 treatises relating to wine and its production.

BRONTË, a town of Sicily, in the province of Catania, near the western base of Mt. Etna, 22 m. N. N. W. of Catania; pop. about 12,000. It has a number of churches, convents, a seminary, manufactures of woollens and paper, and trade in wine, oil, silk, grain, and fruits. In 1799 the Neapolitan government conferred the title of duke of Brontë, with a revenue of about \$18,700 per annum, upon Lord Nelson. The town suffered from an earthquake in 1832.

BRONTË, Charlotte ("Currer Bell"), an English novelist, born at Thornton, Yorkshire, April 21, 1816, died at Haworth, March 31, 1855. She was the daughter of the Rev. Patrick Brontë, a native of Ireland, who shortly before her birth became curate of Thornton church, and in 1820 minister of Haworth. She lost her mother at the age of five. Owing to her father's narrow means, the family were early inured to industry and self-denial, and being, by the habits and circumstances of the place, in a great degree cut off from the ordinary pleasures of childhood, they were accustomed to occupations and amusements beyond their years. In 1824 Charlotte and three of her sisters, Maria, Elizabeth, and Emily, were put to a school at a place called Cowan's Bridge. The situation proved to be unhealthy, and Maria and Elizabeth died the following year from disease contracted there. The hardships suffered at this school from scanty food and severe discipline furnished to a considerable extent the theme of "Jane Eyre." In the autumn of 1825 Charlotte and Emily left the school, and for several years lived at home. During this period Charlotte had the care of the younger members of the family; she spent much of her time in writing, and manifested a development of mind and a compass and facility of thought remarkable in a girl of her age. In the winter of 1831 she was again put to school at a place called Roe Head, where she continued nearly two years. Here she was free from discomforts, save what grew from a tendency to despondency. She cared nothing for play; was quiet and studious, often confounding her schoolmates by knowing things quite out of their range; and sometimes exercised her genius in telling stories for their entertainment. In 1835 she reëntered the school as a

teacher; but the labor wore upon her health and spirits till she was forced to give it up. In 1839 she obtained a situation as governess, but fell into a hard and uncongenial family, from which she soon withdrew. In 1841 she went out again as governess, and met with kind and appreciative treatment; but the occupation was not suited to her disposition. She next determined, in conjunction with her sisters Emily and Anne, to establish a school of her own; and to qualify themselves for the task, she and Emily in the winter of 1842 went to Brussels. At the end of six months they were employed as teachers in the school they were attending. Emily did not remain quite a year, but Charlotte spent nearly two years there. In the summer of 1844 the arrangements were made for opening a school at Haworth; they sent out circulars, and received many assurances of good wishes to the enterprise, but obtained no pupils. Henceforth the sisters remained at home, dividing their time between household cares and literary labors. In 1846 they issued at their own risk, under the names of Currer, Ellis, and Acton Bell, a volume of poems; but the work met with little favor. Notwithstanding this failure, each of them wrote a prose tale, hoping the three would be published together. These were, "The Professor," by Charlotte; "Wuthering Heights," by Emily; and "Agnes Grey," by Anne; the names assumed in the volume of poems being still retained. The last two found a publisher; the first was everywhere refused, nor did it appear till after the author's death. It was under the weight of all this discouragement that Charlotte undertook the composition of "Jane Eyre," which was published in October, 1847, and met with immense success; it was translated into most European languages, and dramatized in England and also in Germany under the title of "The Orphan of Lowood." Emily, to whom Charlotte had been deeply attached, died Dec. 19, 1848. Anne died May 28, 1849, her novel, "The Tenant of Wildfell Hall," having been published the preceding year. Charlotte's second novel, "Shirley," was published in October, 1849. She had taken great pains with the work, but it hardly made good the expectations raised by "Jane Eyre." From the large use she made of local manners and traditions, the secret of the authorship soon transpired, and she was invited to London, where she was introduced to the prominent literary characters of the time. Her third novel, "Villette," published in 1853, seems to have taken more or less of its shape and texture from the author's recollections of Brussels. In strength and originality of characterization it does not equal "Shirley," but is perhaps more interesting and attractive as a whole. It met with almost unbounded applause. About this time Miss Brontë had an offer of marriage from the Rev. Arthur Nicholls, her father's curate. Mr. Brontë objected to the match, and Mr. Nicholls resigned

his curacy; but by the spring of 1854 Mr. Brontë came to view the matter in a different light, and an engagement was formed. Mr. Nicholls resumed the curacy, and the marriage took place in the following June. They continued to reside at the parsonage until her death. "The Professor" was published some time after the death of the author, and a few chapters of her unfinished novel entitled "Emma" appeared in 1860 in the "Cornhill Magazine," then edited by her friend W. M. Thackeray. A biography of Charlotte Brontë, by Mrs. Gaskell, was published in 1857, and a second edition, considerably modified, in 1858.

BRONZE, an alloy consisting of proportions of copper and tin which vary according to the purpose desired, and to which lead, zinc, and silver are sometimes added for the purpose of giving greater brilliancy to the compound, or rendering it more fusible, the zinc being introduced in the form of brass. In some of the modern bronzes brass is used instead of tin; these are then nothing more than brass consisting of very large proportions of copper. The principal varieties of bronze are speculum metal, bell metal, gun metal, and statuary bronze. Speculum metal of reflecting telescopes is the whitest, hardest, most brilliant, and most brittle of all the bronze alloys; it consists of 100 parts of tin and 215 of copper. Bell metal is usually composed of 78 parts of copper and 22 of tin. This is also the composition of the Chinese gongs, which are forged under the hammer the alloy being rendered malleable after casting by plunging it at a cherry-red heat into cold water; the plate is kept in shape by confining it between two disks of iron. Cannon metal consists of 90 to 91 parts in 100 of copper, and the rest of tin; the strength of this compound is stated by Dr. Thomson to be one half that of malleable iron. Antique bronze consisted of about 87 parts of copper to 13 of tin. Most of the modern French bronzes are composed of about 91 per cent. of copper, 2 of tin, 6 of zinc, and 1 of lead. The following table gives the composition of several ancient and modern bronzes from various authorities:

BRONZES.	Copper.	Tin.	Other Metals.
Coin of Alexander the Great, 335 B. C.	86.72	13.14	
Ptolemy IX., 70 B. C.	84.25	15.64	Iron, a trace.
Old Attic coin.	88.46	10.94	Lead, 1.05.
Roman coin, 509 B. C.	62.04	7.66	Lead, 29.32.
Celtic weapon.	85.23	13.11	Lead, 1.14.
Celtic vessels.	88.00	12.00	
Egyptian dagger.	85.00	14.00	
Gallo-Roman axe.	77.77	19.61	Lead, 1.15; zinc, 1.44.
Gaulic bell.	85.90	14.10	
Etruscan vessel.	85.00	14.20	Zinc, 0.80.
Chinese gong.	80.30	19.50	
Tam-tams.	78.00	22.00	
Old bell at Rouen.	71.00	26.00	Zinc, 1.8; iron, 1.2.

The qualities of bronze of the same composition depend much upon the temperature of the alloy when poured, and on the rapidity of the cooling.—In making bronze, the metals are melted separately, and the tin is added and the

ture stirred until it is homogeneous. It is then turned into the mould as quickly as possible, and when the exterior is sufficiently solidified the casting is uncovered, in order, by hastening the setting of the interior, to prevent as much as possible the formation of strata of unequal composition, which is liable to occur on account of the great difference in the fusibility of the metals, that of copper being above 2,200° F., while tin melts at 442°. In casting cannon, where there is a great mass of metal, such stratification is liable to occur, the parts which solidify first being richer in copper. This difficulty is largely overcome by the addition of but one tenth per cent. of phosphorus, by which the grain of the bronze is also improved. After cooling, if it is again raised to a temperature of about 1,000°, and allowed to cool slowly, its toughness of texture will be improved. The dark olive hue which bronze acquires by exposure is hastened by the application of oxidizing washes, and different shades may be given according to the chemical quality of the wash employed. Some extract the copper from the surface, and leave the copper in mass, and others remove the copper and leave the tin most prominent.—Among the ancient Egyptians, Greeks, and Romans, the manufacture of bronze articles was very extensively carried on. In Greece especially the taste for statuary in this material was cultivated to an unparalleled extent. The wealth of some cities was estimated by the number of their statues. Athens alone no fewer than 3,000 statues have been found, and in Rhodes, at Olympia, and Delphi many more. The famous colossuses were cast of this alloy. The names of many of the ancient artists are still celebrated, and their groups of statuary continue to be our models. The alloy was employed by them for purposes which we apply the harder metals, as in some periods for their arms and armor, medals, and even their surgical instruments, a set of which was discovered at Pompeii. By them it was regarded as a sacred metal, and endowed with a mysterious power of driving away evil spirits. The laws were inscribed on tables of bronze, and upon bronze coins alone were placed the words *moneta sacra*. The Phœnicians were the first known workers of it; they made into plates, which were nailed together; and they also cast it solid, and cored. The Athenian sculptor Myron employed it of a pale color of unknown composition, in the 5th century B. C. The Corinthian bronze is supposed to have been suggested by the accidental fusing of metals at the burning of Corinth, 146 B. C.; it was of three colors, white, yellow, and the rest not known. The antique liver-colored antique-cents, and the Florentine bronze, are of the same shade, approaching a dull reddish brown.—Aluminum bronze is composed of 90 parts of copper and 10 of aluminum. It resembles gold, and is used in ornaments.

BRONZING, the process of covering articles of wood, clay, plaster, metals, ivory, &c., with

compositions which give to them the appearance of bronze. These compositions vary in their ingredients, and the process also, with the articles to be coated. An application is first made of size or oil varnish, into which when nearly dry a metallic powder is rubbed, or this may be previously mixed with the varnish. This powder is most commonly a preparation called gold powder, prepared as follows: Gold leaf is ground together with honey upon a stone. When thoroughly mixed, and the particles of gold completely reduced, the preparation is stirred up in water, and washed until the honey is entirely removed. The gold which settles is then collected upon filtering paper and dried. Another variety of powder, called *aurum mosaicum* or *musivum*, is prepared in the following manner: A pound of tin, melted in a crucible, is amalgamated with half its weight of pure mercury. When the amalgam is cold, it is reduced to powder, and ground with $\frac{1}{4}$ lb. of sal ammoniac and 7 oz. of sulphur. On subliming this mixture in a matrass, the tin remains at the bottom of the vessel in a flaky golden powder, which is the *aurum mosaicum*. A shade of red is given to this when desired, by adding a small portion of red lead. Copper powder is obtained for the same purpose by the precipitation of the metal from its solution in nitric or sulphuric acid, by means of pieces of metallic iron. The copper deposits itself upon these, from which it may be brushed off in powder, care being taken to exclude it from the action of the air as it is washed in water, or better in alcohol. It is used either alone or mixed with pulverized bone ash. The preparation called gold size is also used in bronzing. It is made by boiling 4 oz. of powdered gum animé and a pound of linseed oil, the gum being gradually added, and stirred into the oil while this is heated. The boiling is continued till the mixture becomes thicker than tar. This is then to be strained through a coarse cloth. When applied, vermilion is added to render it opaque, and a convenient consistency is given to it with oil of turpentine. After being applied, it is allowed to dry very nearly, and when it has become sufficiently hard the powder selected is rubbed over the work with a piece of soft leather wrapped round the finger; or the application is better made with a soft camel's hair pencil, with which, when quite dry, the loose powder is brushed away. If gold size is not to be used, the powders may be mixed in gum water and laid on with a brush.—Vinegar is often applied to brass castings to give them the green bronze color, sometimes in combination with sal ammoniac and sometimes with common salt. Coins and medals are sometimes bronzed with a solution of verdigris and sal ammoniac in vinegar, which is afterward diluted with water and boiled, and applied while hot. It is said that the Chinese bronze copper vessels by taking 2 parts of verdigris, 2 of cinnabar, 5 of sal ammoniac, and 5 of alum in powder, making a

paste with vinegar, and laying this on the brightened metal, which is then held over a fire, and afterward cooled, washed, and dried; the operation being repeated till the desired color appears. The cinnabar produces a thin coat of sulphuret of copper on the surface of the metal. New bronze articles may be made to assume an antique appearance by the repeated application of a solution of 4 parts of sal ammoniac, 1 of binxalate of potash, and 50 of vinegar; the application should be made with a soft rag, and the article rubbed with it till dry. The best bronzing liquid to apply to copper, brass, new bronze, or iron is a solution of chloride of platinum; almost any bronze tint may be produced with it, according to the number of applications or the strength of the solution.—Mr. Hiram Tucker of New York has invented a process for bronzing cast iron, which consists in covering the cleaned or polished surface of the iron with a vegetable oil, and subjecting the article to a degree of heat which will decompose the oil without charring it. By this means the surface of the iron becomes oxidized in such a manner as to cause it to have a close resemblance to real bronze. It is said to possess considerable durability, and as cast iron has the quality of filling the mould completely and making a fine casting, the invention will probably prove of much value in the arts. Bronzing and browning gun barrels, and other articles of iron, is effected by first thoroughly rusting the surface by an application of chloride of antimony, mixed with olive oil, and rubbed upon the iron slightly heated. The operation is hastened by subsequent rubbing with dilute nitric acid. This, or dilute muriatic acid, is sometimes used instead of the chloride of antimony. The barrel is then well cleaned, washed with water, dried, and finally polished with a steel burnisher, or rubbed with wax, or varnished with a very weak solution of shellac and alcohol.

BROOKE, a N. county of West Virginia, forming part of the narrow strip between Pennsylvania and Ohio, called the Panhandle; area, 75 sq. m.; pop. in 1870, 5,464, of whom 97 were colored. It is watered by small creeks that fall into the Ohio. The soil is fertile and the surface hilly. The Pittsburgh, Cincinnati, and St. Louis railroad passes through the county. The chief productions in 1870 were 45,884 bushels of wheat, 185,576 of Indian corn, 81,135 of oats, 14,112 of barley, 45,850 of potatoes, 7,570 tons of hay, 110,307 lbs. of butter, and 185,105 of wool. There were 1,230 horses, 1,060 milch cows, 1,509 other cattle, 46,581 sheep, and 2,920 swine. Capital Wellsburg.

BROOKE, Frances, an English authoress, wife of the Rev. John Brooke, died in 1789. She wrote sonnets, translations, novels, and tragedies. Her best work, the "History of Emily Montagu" (1769), contains fine descriptions of the scenery of Canada, where she resided for some time. Of her dramas, "Rosina," acted at Covent Garden in 1782, was the most successful.

BROOKE, I. Francis J., an American magistrate, born in Virginia, Aug. 27, 1763, died March 3, 1851. He was an officer of the revolution, and an intimate friend of Washington. At 16 he was appointed lieutenant in Gen. Harrison's regiment of artillery, and served his first campaign under Lafayette. He afterward joined the army of Gen. Greene, and was at Charleston at the end of the war. He was admitted to the bar in 1788, was repeatedly elected to the legislature of Virginia, and was a judge from 1804 to the end of his life. **II. Francis J.**, son of the preceding, died Dec. 25, 1837. He joined the army in 1822, and fell in the battle of Okeechobee, Fla., in which he took a distinguished part. **III. George Mercer**, brother of the judge, died at San Antonio, Texas, March 9, 1851. Having entered the military service in 1808, he was promoted to the rank of lieutenant colonel, Aug. 15, 1814, for his brave conduct in the defence of Fort Erie, in which he was wounded. He fought with distinction in the war with Mexico, and in 1848 was made major general.

BROOKE, Henry, an Irish novelist and dramatist, born at Rantavan in 1706, died in Dublin, Oct. 10, 1783. A poem, "Universal Beauty," introduced him to Swift and others, including the prince of Wales (father of George III.), to support whom in his antagonist position to his father Mr. Brooke is said to have written, in 1788, the tragedy of "Gustavus Vasa." The licenser of plays, believing that it was directed against Sir Robert Walpole, forbade its performance after it had been rehearsed at Drury Lane theatre; but the play was published, and brought the author £1,000. In 1745, when the rebellion broke out in Scotland, he wrote the "Farmer's Letters," which were believed to have greatly influenced the Irish against taking up arms for the Stuarts. An opera, called "Jack the Giant Killer," which was to have been produced soon after the close of the rebellion, was prohibited by the Irish government, who feared that it might be taken as a reflection on the duke of Cumberland, but he obtained £800 by its publication; at the same time he was appointed barrackmaster of Mullingar by Lord Chesterfield, the viceroy. In 1752 his tragedy, "The Earl of Essex," was successfully played in Dublin, and in 1762 at Drury Lane theatre. His novel entitled "The Fool of Quality" has had considerable celebrity. He also translated a part of Tasso's *Gerusalemme liberata*.

BROOKE, Sir James, rajah of Sarawak, born in Bengal, April 29, 1803, died in Devonshire, England, June 11, 1868. His father, having taken up his residence at Bath, England, procured for him a cadetship in the East India service. He received a severe gunshot wound in the chest at the storming of a stockade in the Burmese war, and was forced to return to England. He travelled on the continent, and found on his return to India in 1830 that he had exceeded his leave of absence and for-

ed his appointment. On a voyage from Cutta to China he conceived the idea of establishing a civilized power among the islands of the Indian archipelago. He returned to England, purchased a yacht out of the royal patronage, enjoying the same privileges as a man-of-war, and sailed for the East in October, 1838. On his arrival at Sarawak, on the island of Borneo, he found the country in a state of anarchy, the Dyaks, its inhabitants, carrying on a constant contest. To secure his assistance, the rajah offered to make Brooke his successor, and give him the command of the army. Established in authority over Sarawak, after defeating the hostile forces with great ease, he endeavored to accustom the inhabitants to a regular government, and to turn them from piracy and local war to agriculture and trade, which he succeeded to an extraordinary degree. In conjunction with the English naval commanders he attacked, routed, and exterminated the Malay pirates of the archipelago. Though independent of the English, and holding the dignity of rajah by appointment from the sultan of Borneo, when his conduct was attacked in England, he visited that country in 1847 to vindicate himself. He was subsequently knighted, and received the title of Governor of Labuan, a salary of £2,000, and a staff of subordinate officers under British pay. From this office, however, he was removed after a subsequent visit to England. His rule was greatly for the benefit of his people. He compiled a code of laws, opened trade, made roads, and provided for the security of property. Upon the breaking out of the war of England with China in 1857, his residence was suddenly attacked by a body of 4,000 Chinese, but he escaped only by swimming the river. The Dyaks rallied to his support, and in a short time he fell upon the Chinese, and defeated them with a loss of half their number. The following year he returned to England and took up his residence in Devonshire. He suffered much from the attacks of his enemies in parliament. In 1861 he made two voyages to Borneo, to suppress an insurrection and settle the government, which he left in charge to his nephew, though he retained the title and authority of rajah until his death. Portions of his journals have been published, and the *Private Letters of Sir James Brooke, K. O. from 1838 to the present time* (3 vols., London, 1853).

BROOKINGS, a S. E. county of Dakota, bounded E. by Minnesota, and intersected by the Big Sioux river; area, 750 sq. m.; pop. in 1870, 1,000, of whom 145 were civilized Indians. The western and central portions are watered by streams flowing into the Minnesota river and the Big Sioux, and by numerous lakes; the N. portion is mountainous.

BROOKLINE, a town of Norfolk co., Mass., 10 m. S. W. of Boston, of which it is a suburb; pop. in 1870, 6,650. Almost the whole town is occupied by beautiful country resi-

dences. It contains one of the reservoirs for supplying Boston with water, which covers 38 acres, the water surface being about 22½ acres, and the capacity about 100,000,000 gallons.

BROOKLYN, capital of Kings county, New York, the third city in the United States in point of population, on the W. end of Long Island, opposite New York city, and separated from it by the East river, an arm of the sea connecting the bay of New York with Long Island sound; lat. of the navy yard, 40° 41' 50" N., lon. 73° 59' 30" W. The exterior line of the city measures 22 m., embracing an area of 13,837 acres, or 20·84 sq. m., of which 6·48 sq. m. are devoted to streets and alleys. Beginning at the northeast, its boundaries are Newtown creek and Queens county, the towns of New Lots, Flatbush, and New Utrecht in Kings county, the bay of New York, and the East river. Its extreme length from N. to S. is about 7½ m., and its greatest breadth 5 m.; the average breadth, however, is only about 3½ m. The western boundary of the city affords 8½ m. of water front. Newtown creek, an irregular arm of the bay, receiving several small freshwater streams, is navigable for a mile or two from the East river for vessels of light draught. Wallabout bay is a deep indentation lying between the old cities of Williamsburgh and Brooklyn; Gowanus bay extends into the southern part of the city. Opposite South Brooklyn is Governor's island, between which and the shore is Buttermilk channel, about a quarter of a mile wide, in early times fordable by cattle, but now navigable for the largest vessels. The portion of land between Buttermilk channel and Gowanus bay is known as Red Hook point. Brooklyn is for the most part considerably elevated above tide water. The S. and E. borders are occupied by a broad range of low hills; a large portion of the S. part of the city is low and level. Along the East river S. of Fulton street is an irregular bluff, 70 ft. above the level of the sea, known as Brooklyn Heights. It is thickly built upon, and affords a magnificent view of the city and bay of New York. The city embraces several districts still locally known by the names which they bore when they were distinct municipalities. Brooklyn proper includes the older portion of the city S. of Wallabout bay, and the part of this lying S. of Atlantic avenue is known as South Brooklyn. Williamsburgh includes the thickly settled portions N. of Wallabout bay. Bushwick occupies the N. portion of the city E. of Williamsburgh. South of Wallabout bay is Wallabout, adjoining which is the section called East Brooklyn. Greenpoint lies between Bushwick and Newtown creeks, occupies the extreme N. E. part of the city, and forms the 17th ward. Gowanus is the name of that portion of the city which has grown up around Gowanus bay. Bedford and New Brooklyn are localities in the E. part of the city, formerly separate villages. The city is legally divided into the Eastern District, embracing

Williamsburgh, Bushwick, and Greenpoint, and the Western District, comprising the old city of Brooklyn, and including the first 12 wards and the 19th to the 25th ward. Opposite Greenpoint, and separated from it by Newtown creek, is Hunter's Point, now included in the municipality of Long Island City. Adjoining the S. E. extremity of the city is the large village of East New York, and on the S. W., bordering on Prospect park, is that of Flatbush. —For many years after its settlement Brooklyn was merely a hamlet, but since its incorporation as a city its growth has been remarkably rapid. In 1698 the population was 509. In 1706 there were 64 freeholders; 96 years later the number had only increased to 86. The progress of population in the present century has been as follows: 1800, 3,298; 1810, 4,402; 1820, 7,175; 1830, 15,292; 1840, 36,233; 1845, 59,574; 1850, 96,850; 1855 (including Williamsburgh and Bushwick, previously separate), 205,230; 1860, 266,661; 1865, 296,378; 1870, 396,099. Of the population in 1870, 144,718 were foreigners and 4,944 were colored. Of the natives, 219,774 were born in the state of New York, 6,009 in New Jersey, 5,711 in Massachusetts, 5,264 in Connecticut, and 3,294 in Pennsylvania. Of the foreigners, 79,985 were natives of Ireland, 36,771 of Germany, 18,843 of England, 4,099 of Scotland, 2,806 of British America, 1,894 of France, and 1,105 of Sweden. —Brooklyn possesses many advantages as a place of residence. For the most part considerably elevated above tide water, it is open on all sides to the land and sea breezes, while its wide streets, generally at right angles to each other, afford a free circulation of air. Several avenues 100 ft. wide have been formed, connecting distant points. On the Heights are many fine residences occupied by leading merchants of New York. Of the streets, perhaps Clinton avenue is the most attractive; it is lined with beautiful residences surrounded with extensive ornamental grounds. In the 21st ward many costly dwellings have recently been erected. The principal business thoroughfare is Fulton street, extending about 5 m. from Fulton ferry to East New York; until recently the portion above the city hall was designated as Fulton avenue. Myrtle avenue, extending E. from Fulton street near the city hall, is also a prominent business thoroughfare. Extending from South ferry to East New York, and parallel with Fulton street from near the city hall, is Atlantic avenue, an active business street in its lower part, and in its upper shaded by double rows of trees. Within a few years the business centre has extended from near the foot of Fulton street to the vicinity of the city hall, where are now situated most of the monetary and insurance interests, &c. The great commercial interests are along the river front. —The public buildings of Brooklyn are not remarkable for their imposing size or architecture. The city hall, at the junction of Fulton, Court, and Jerusalem streets, is of white marble in the Ionic

style, with six columns supporting the roof of the portico; its dimensions are 162 by 102 ft., and 75 ft. in height, comprising three stories and a basement; it is surmounted by a tower, the top of which is 153 ft. from the ground; it was built in 1845-'6, and its entire cost was about \$200,000. The county court house, fronting on Fulton street near the city hall, is 140 ft. wide and extends 315 ft. back to Livingston street; it is 64 ft. high, and is surmounted by a cupola composed of ribs and panel work of iron, rising 104 ft. above the street; the main edifice is constructed of Westchester marble in the Corinthian style of architecture; it was erected in 1862, at a total cost of \$543,000. The county jail in Raymond street is a heavy-looking castellated Gothic edifice of red sandstone. The penitentiary is in Nostrand avenue, on the border of the city. The state arsenal is in Portland avenue near Washington park. The post office is a rented building in Washington street near the city hall; there are sub-stations in Williamsburgh and Greenpoint. The academy of music in Montague street, near the city hall, was erected in 1860 at a cost of \$206,000; it is built of the best quality of brick with Dorchester stone trimmings, 232 ft. long, 92 ft. wide, and 56 ft. high, and is capable of seating 2,500 persons. Adjoining the academy is the fine edifice of the art association, while opposite is the elegant building of the mercantile library, erected in 1868 at a cost of more than \$150,000. The city hospital, on elevated ground in Raymond street near De Kalb avenue, is of brick with stone dressing; it has a front of 200 ft., facing Raymond street, and consists of a main building four stories high, 52 ft. in width and depth, with a rear extension of 30 ft., and two wings, each 74 ft. long, 56 ft. deep, and three stories high. Among other noticeable buildings may be mentioned the iron structure of the Long Island safe deposit company on the corner of Front and Fulton streets, erected in 1868 at a cost of \$150,000; the building occupied by the young men's Christian association, in Fulton street, corner of Gallatin place; and the elegant building of the Kings County savings bank, corner of Fourth street and Broadway, erected in 1868 at a cost of \$195,000. Ground has been purchased on the corner of Clinton and Remsen streets on which to erect a costly building for the Long Island historical society. —From its great number of church edifices, Brooklyn is often called the city of churches. Among the more prominent of these is St. Ann's (Episcopal), with its adjoining chapel, on the corner of Clinton and Livingston streets, erected in 1868 at a cost of about \$200,000; it is constructed of Belleville and Cleveland stone in the middle pointed Gothic style, 126 ft. long, 75 ft. wide, and 90 ft. high, and can seat 2,400 persons. The church of the Holy Trinity (Episcopal), a brown stone edifice in the Gothic style, on the corner of Clinton and Montague streets, was erected in 1847 at a cost, including chapel, of about \$175,000. The

recently completed at a cost of \$55,000, highest in Brooklyn, being 275 ft. high, of great architectural beauty. St. Paul's (episcopal), corner of Clinton and Carroll streets, is a Gothic structure of rough-hewn granite, handsomely relieved with sandstone; it has a front of 75 ft., a depth of 145 ft., and is 67 ft. high in the nave; it has seats for 1,200 and cost \$150,000. The church of the Holy Trinity (of which the Rev. Dr. R. S. Storrs has been pastor since 1846), corner of Henry and Nassau streets, is of gray stone, its tall tower and spire forming a commanding object to the eye as one approaches the city from the bay. Inside, in the main tower, about 6 ft. from the ground, may be seen a piece of the "Pillar of the Rock," from Plymouth, Mass. Plymouth Church (Congregational), in Orange street, between Hicks and Henry streets, is a plain structure with accommodations for 2,800 persons, and containing the largest church in America, which was built in Boston. The Rev. Henry Ward Beecher has been the pastor since 1847. The amount realized from the rental of pews for 1873 was \$60,230. The Dutch Reformed church, in Pierrepont street, near Monroe place, is of brown stone in the Dutch Colonial style, with a depth of 100 ft., a front of 70 ft., having a portico supported by Corinthian pillars. A Roman Catholic cathedral is in process of construction, which will occupy the entire block bounded by Greene, Rensselaer, Vanderbilt, and Clermont avenues; when completed it will be one of the largest cathedrals in the United States. Among the churches of marked appearance may be mentioned Grace (Episcopal), in Hicks street; St. Ann's (Episcopal), corner of Clinton and Hart streets; the Methodist church corner of Nassau and Willoughby avenues, erected in 1866 at a cost of \$75,000; and the new edifice of St. Charles Borromeo (Roman Catholic), in Nassau place, which cost \$75,000.—One of the most important elements in the prosperity of the city is Prospect park, the construction of which was begun in 1866, from plans and under the superintendence of Olmsted, Vaux & Co., who also laid out Central park, New York. The site chosen is a portion of an elevated ridge in the S. W. part of the city, adjoining Flatbush, and commands a magnificent view of the cities of New York and Brooklyn, the inner and outer harbor, Long Island, the bay shore, and the Atlantic. This spot affords equal natural advantages by its wooded and broad meadows. The park, with the adjoining parade ground, contains 550 acres. The ground was beautifully shaded by old trees, which have been skillfully improved. Great many large trees have been transplanted to the park, which already has the character of an old pleasure ground, and is very attractive. The main entrance, at the junction of Central park, Flatbush, and Vanderbilt avenues, is a large ellipse called the plaza, containing a fountain and a statue of Abraham Lincoln. A lake

about 50 acres in extent, surrounded by a beautiful driveway, is in process of construction, and when completed will contain a large fountain. Among other prominent features included in the design are zoölogical gardens to cover 25 acres, and a grand observatory on Lookout hill. Seven miles of driving and three miles of riding roads have been formed, besides 11 miles of walks. The cost of the land was about \$5,000,000, and up to January, 1873, nearly \$4,000,000 had been expended in its improvement. In 1872 there were about 6,000,000 visitors to the park. The increase in the value of real estate in its vicinity since the beginning of the enterprise is estimated at \$33,000,000. In connection with the park a series of boulevards 200 ft. wide have been designed, leading to it from distant points. The Ocean parkway, one of the finest, is laid out from the S. W. corner of the park to the seashore at Coney island, a distance of 8 m. The Eastern parkway, also laid out, extends from the plaza along the line of Sackett street 2½ m. to East New York. It is a part of the scheme to extend this boulevard so as to cross the East river by the bridge to be constructed at Blackwell's island, and connect with the Central Park boulevard. Others are designed to connect the park with Fort Hamilton and Bath, and with Sheepshead bay, all attractive summer resorts. With the completion of these improvements it is asserted that Brooklyn will be the most attractive city in the United States for driving. Washington park (Fort Greene) is on an elevated plateau E. of the city hall, between Myrtle and De Kalb avenues and Canton and Cumberland streets; it contains 30 acres. During the war of the revolution it was the site of extensive earthworks. It commands an extensive view, and has been recently greatly improved and surrounded by a handsome stone wall. Besides these two there are Tompkins square, containing 8 acres, bounded by Marcy, Greene, Tompkins, and Lafayette avenues; the City park, 7 acres, near the navy yard; Carroll park, 2 acres, bounded by Court, President, Smith, and Carroll streets; and the City Hall park, containing about 1½ acre. The parks are under the control of a board of 10 commissioners, of which the mayor is a member *ex officio*.—Greenwood cemetery, widely noted for its natural and artificial beauties, is on Gowanus heights in the S. part of the city. It was opened for interments in 1842, and contains 413 acres, about one half of which is covered with wood of natural growth. The entire cost of the land was \$281,684. At the main entrance, near 5th avenue and 28d street, is a highly ornamental structure of brown stone, monumental in form, in the middle pointed English Gothic style, 132 ft. long and 40 ft. deep, the central pinnacle being 106 ft. high. It is ornamented with figures representing scenes from the Gospels, chief of which are the entombment and the resurrection of the Saviour. The grounds have a varied surface of

hill, valley, and plain, and are traversed by 17 m. of carriage roads and 15 m. of foot paths. The elevations afford extensive views. Greenwood contains many beautiful monuments, chief among which are the pilots' and firemen's monuments, the soldiers' monument (unfinished), erected by the city of New York, and that

the foot of Greenpoint avenue, the one to the foot of 10th, the other to the foot of 23d street, New York. The Houston street associates run a ferry from the foot of Grand street, Eastern District, to the foot of Houston street, New York. The New York and Brooklyn company runs lines from the foot of Bridge street, Brook-



Entrance to Greenwood Cemetery.

to the memory of Miss Canda. In 1871 the total number of interments had been 154,803. The Cypress Hills cemetery, about a mile east of the city limits, beyond East New York, occupies an elevated ridge of land, and contains nearly 400 acres, about one half of which is improved. The cemetery is beautifully arranged, and affords fine views of the surrounding country. More than 70,000 persons have been interred here. In the soldiers' plot are buried the bodies of 4,000 soldiers. The cemetery of the Evergreens, incorporated in 1849, near Bushwick, contains 207 acres, of which 60 are within the city limits. The Citizens' Union cemetery, between Butler and Sackett streets and Rochester and Ralph avenues, contains 10 acres, and is designed as a burial place for colored persons. The cemetery of the Holy Cross at Flatbush contains 36 acres, and is the principal Roman Catholic burying ground. Other cemeteries in the vicinity are Calvary (Catholic), on Laurel Hill, Queens county; Mount Olivet, near Maspeth; Washington, $1\frac{1}{2}$ m. S. of Greenwood; the Friends' cemetery, near the city line, S. of Greenwood; and the Lutheran, between Cypress Hills and Mount Olivet. Nearly all the interments from New York are made in these cemeteries in and around Brooklyn.—Brooklyn is connected with New York by 12 steam ferries, belonging to five companies. The Greenpoint company runs two lines from

lynn, to James slip, New York; from the foot of Broadway (formerly S. 7th street), Eastern District, to Grand and to Roosevelt streets, New York; and from the foot of Grand street, Eastern District, to Grand street, New York. The Union ferry company has a capital of \$1,000,000, and owns the following ferries: Catharine ferry, from Main street, Brooklyn, to Catharine street, New York; Fulton ferry, from Fulton street, Brooklyn, to Fulton street, New York; Wall street ferry, from Montague street, Brooklyn, to Wall street, New York; South ferry, from Atlantic street, Brooklyn, to Whitehall street, New York; and Hamilton ferry, from Hamilton avenue, Brooklyn, to Whitehall street, New York. The boats of these ferries run constantly during the day at intervals of a few minutes.



Fulton Ferry in 1791.

and some of them all night. There are commodious ferry houses for the accommodation of passengers, of which the most noticeable for its size and architecture is that recently

ruined at the foot of Fulton street, Brooklyn. The number of persons who crossed the river on ferries was 32,845,950 in 1860, 10,000 in 1865, and about 60,000,000 in 1872. Inadequacy of the ferries to accommodate immense number of persons daily crossing between the two cities, and the occasional interruptions through fog and ice, led to the proposal of the East river bridge, which is now in process of construction, and is expected to be completed before the end of 1877. Brooklyn terminus will be in the square bounded by Fulton, Prospect, Sands, and Livingston streets; the New York terminus at South Street, opposite the City Hall.

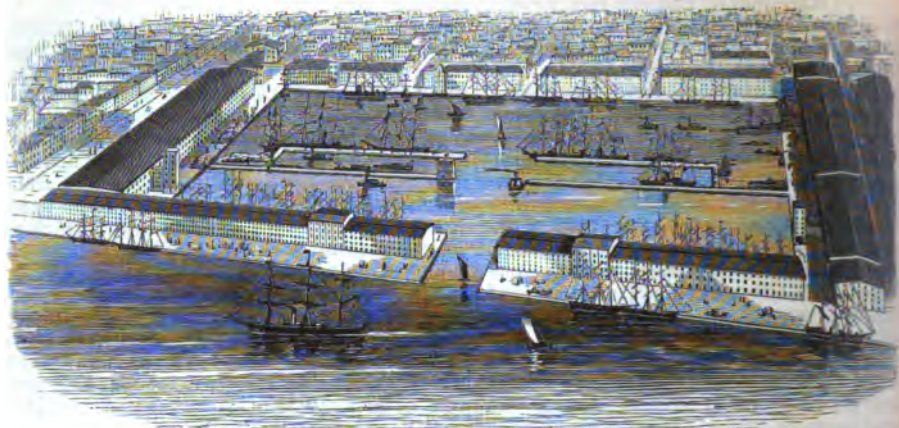
The supporting tower on the Brooklyn side is just N. of the Fulton ferry house; New York tower is at pier 29, near the foot of Roosevelt street. The bridge may be divided into five parts: the central span across the river from tower to tower, 1,595 ft. long; an approach on each side from the tower to the shore, 940 ft. long; and the approaches from the terminus to the anchorage on each side, 120 ft. long.

The whole length of the bridge will be 3,655 ft. It will be 85 ft. wide, including a promenade of 13 ft., two railroad tracks, and two wagon or horse-car tracks. From high-water mark to the floor of the bridge in the center will be a distance of 135 ft., so that navigation will not be impeded. The central span will be suspended to four cables of steel wire, each 16 inches in diameter, which are to be assisted by stays. These cables will have a deflection of 128 ft. Each tower rests immediately upon a caisson (see CAISSON) sunk to bedrock beneath the river, which on the Brooklyn side is 45 ft. and on the New York side 82 to 92 ft. below the surface of the water. Brooklyn caisson is 168 ft. long by 102 ft. wide. The towers erected upon these foundations will be 134 ft. in length by 56 ft. in width at the water line; below the upper corner at the top these dimensions are reduced, by sloped offsets at intervals, to 120 ft. by 40 ft. Total height above high water of each tower will be 268 ft. At the anchorages of the four cables, after passing over the towers, enters the anchor walls at an elevation of nearly 80 ft. above high water, and extends through the masonry a distance of 20 ft. at which point a connection is formed with the anchor chains. Each anchorage will contain about 85,000 cubic yards of masonry; that on the Brooklyn side will be in James street. The spans from the anchorages to the towers will be suspended to the cables and carried over the roofs of the buildings underneath. The approach on the Brooklyn side from the terminus to the anchorage will measure 836 ft. on the New York side, 1,336 ft. These approaches will be supported by iron girders and trusses, which will rest at short intervals on small piers of masonry, or iron columns within the blocks crossed and occupied. The streets will be crossed by iron girders at

such elevations as to leave them unobstructed. The Brooklyn terminus is 68 ft. above high tide. The total cost of the bridge, including the property on each side, will probably reach \$10,000,000. — Brooklyn has communication with other parts of Long Island by means of three steam railroads: the Long Island and the Flushing and North Side, which start from Hunter's Point just outside the city limits; and the South Side, the city terminus of which is at the foot of S. 8th street, between which point and Bushwick its cars are drawn by dummies. The Brooklyn, Bath, and Coney Island and railroad communicates with Coney Island, the depot being at Greenwood. A railroad to connect with the new town on Hempstead plains projected by Mr. A. T. Stewart is in process of construction. About 25 lines of city passenger railroads, using horse power, radiate from the ferries to all parts of the city and suburbs. Of these, nine or ten belonging to the Brooklyn city railroad company have their terminus at Fulton ferry; and six other lines start from the same point. Measures are now (1873) in progress for the construction of an underground steam railroad between Fulton ferry and the southern limit of Prospect park. — Brooklyn is not a port of entry, being a part of the customs district of New York; but the immense commercial interests along the shore line form one of the chief features of the city. Its water front of $8\frac{1}{2}$ m. is completely occupied by piers, slips, warehouses, boat and ship yards, ferries, &c. Here are some of the most extensive and commodious docks, piers, and warehouses in the United States. The immense quantities of grain received here make Brooklyn one of the greatest grain depots in the world. Grain is brought from the western states by canal and river to this port, where it is stored for distribution in the eastern and southern ports of the United States and in Europe. The capacity of the grain warehouses is estimated at 12,000,000 bushels. The most extensive commercial interests along the shore line are found between Red Hook point on the south and Main street on the north. Within these limits it is estimated that 25,000 vessels, exclusive of canal boats and lighters, are annually unloaded. The chief articles are molasses, sugar, grain, coffee, oil, hides, and wool. The value of the merchandise annually stored is estimated as follows:

South of Hamilton ferry.....	\$50,000,000
Between Hamilton and South ferries.....	60,000,000
Between South and Fulton ferries.....	126,000,000
Between Fulton ferry and Main street.....	25,000,000
Total.....	\$261,000,000

Fronting Governor's island, near the S. extremity of the shore line, stands the massive Atlantic dock, built by a company incorporated in 1840 with a capital of \$1,000,000. The basin is a parallelogram in form, has an area of 40 acres with a depth of 25 ft., and will accommodate the largest vessels; 500 vessels can



Atlantic Dock.

occupy it at the same time, and 400 canal boats besides many other vessels have floated upon it at once. The pier line on Buttermilk channel is 3,000 ft. long; the total wharfage is about 2 m. Surrounding the basin on all sides, excepting an entrance 200 ft. wide for vessels, are substantial brick and granite warehouses, from two to five stories high, and covering an area of 20 acres. Grain is the chief article stored here, for the reception of which nine steam elevators are employed, the largest of which will raise 3,000 bushels per hour. The value of merchandise stored annually in the warehouses of this company and those south of them to Red Hook point is estimated as follows:

Grain	\$20,000,000
Sugar and molasses	15,000,000
Provisions	2,500,000
Flour	1,500,000
Lumber and stone	1,200,000
Cotton	1,500,000
Guano	1,500,000
Rags	500,000
Saltpetre and brimstone	100,000
Salt	500,000
Iron	2,000,000
Miscellaneous, including rosin, turpentine, &c.	4,000,000
Total	\$50,000,000

South of the Atlantic dock, on Gowanus bay, are the extensive Erie and Brooklyn basins, not yet completed. The property of this company comprises an extensive water front with 28 ft. of water in the channel. These basins are separated by a pier, of which Columbia street forms the E. side. On the W. side of this pier is the Erie basin, containing about 60 acres of water and surrounded by spacious piers with extensive warehouses. E. of the Columbia street pier is the Brooklyn basin, 1,300 ft. long and 450 ft. wide, with an area of 40 acres. Near the Erie basin two extensive dry docks have been recently constructed, capable of receiving vessels of large size even when loaded. At the N. end of Washington avenue is the Wallabout basin, recently formed from marsh land, with extensive piers

and bulkheads. The basin proper extends from Washington avenue S. to Hewes street, 1,500 ft. Lumber, coal, and brick yards line the entire length of the basin on one side. The number of vessels that discharged cargoes at these docks in 1872 exceeded 3,000. The cost of the Wallabout improvement has been about \$1,000,000. By it an additional wharfage of three fourths of a mile is secured; while the distance between the Eastern and Western Districts has been reduced three fifths of a mile by the extension of Washington avenue through the marsh from Flushing to Kent avenue. Between the navy yard and Bushwick creek, in Williamsburgh, the shore is lined with ship yards, distilleries, sugar refineries, lumber, brick, and coal yards, and gas works; while the Greenpoint water front, between Bushwick and Newtown creeks, is chiefly occupied by large ship yards. The United States navy yard, on the S. shore of Wallabout bay, embraces a total area of 144 acres, including more than a mile of the most eligible wharfage in the harbor. The yard proper comprises 45 acres, enclosed by a high brick wall. About 2,000 men are constantly employed here. Within is an immense dry dock, one of the most remarkable structures of the kind in the world, built of granite, at a total cost of \$2,113,173. The main chamber is 286 ft. long by 35 ft. wide at the bottom, and 307 ft. long by 98 ft. wide at the top, with a depth of 36 ft. The dock can be emptied by steam pumps in 4½ hours. Half a mile E. of the navy yard, on the opposite side of the Wallabout, is the marine hospital, a handsome structure with 21 acres of ground, and with accommodations for 500 patients. The United States naval lyceum, founded by officers of the navy in 1833, is situated in the navy yard; it has a library, a large collection of curiosities, and valuable geological and mineralogical cabinets. Fronting Flushing avenue, a short distance E. of the navy yard, are extensive marine barracks.—Brooklyn contains numerous manufacturing

establishments remarkable for the extent of their operations. In Kent avenue, in the Eastern District, is the printing house and book manufactory of the firm of D. Appleton and co., the most extensive and completely arranged establishment of the kind in the United States. The buildings are constructed of brick with marble trimmings, and occupy three blocks of a square, enclosing one and a quarter acre. Each corner has a tower-like structure, the one on the N. side being 100 ft. high. The establishment contains commodious press, composing, and store rooms, stereotyping and electrotyping departments, and the extensive bookery. In 1870 the number of manufacturing establishments in Kings county, including other industries, nearly all within the limits of Brooklyn, was 1,043; capital invested, \$25,498,191; number of hands employed, 18,545; value of products, \$60,848,673. The most extensive interests were:

ESTABLISHMENTS.	No.	Capital.	Value of products.
oil, rectified.....	4	\$883,500	\$1,747,235
and chemicals.....	15	843,000	1,799,357
and boilers.....	12	821,645	487,000
ring mills.....	5	645,000	2,092,000
ware.....	4	2,200,000	2,166,334
and caps.....	12	460,666	993,464
all kinds.....	7	316,000	1,074,348
ed oil.....	80	968,055	1,538,724
ber.....	1	250,000	1,668,000
inery.....	10	563,000	1,364,100
liquors.....	35	785,100	1,108,998
ble and stone work.....	27	1,481,000	1,489,529
ts.....	30	352,900	661,565
doors, and blinds.....	8	618,000	1,206,850
building and repairing.....	26	296,800	653,897
ar (refined) and molasses.....	12	127,800	218,007
copper, and sheet-iron.....	7	3,090,000	16,796,851
ce (not cigars) and snuff.....	83	762,100	1,218,495
llen goods.....	5	755,000	4,036,912
	2	512,000	1,280,000

Among other extensive manufacturing establishments are the Brooklyn brass and copper company, the New York agricultural works, the American steel company's works, Campbell's printing press manufactory, and the New York chemical works. The numerous buildings of the last named are built of brick and cover an area of six acres. In the Eastern District are extensive sugar refineries and distilleries, and numerous lagerbeer breweries of immense size.—Brooklyn contains 11 insurance companies chartered by the state of New York, with assets aggregating \$3,748,000. There are 5 national banks, with an aggregate capital of \$1,552,000, and 6 state banks operating under special charters, with a capital of \$600,000. In 1872 there were 17 savings banks, with 115,693 depositors and deposits amounting to \$39,458,630. The principal of these were the Brooklyn savings bank, which had 24,293 depositors and deposits to the amount of \$10,375,872, and the Dime savings bank, with 26,458 depositors and \$6,695,503 deposits. There are also two safe deposit companies and a trust company.—The city is divided into 25 wards, and is governed by a

mayor (salary \$10,000) and a board of 36 aldermen (\$1,000), elected by the people for two years. There are also 13 departments, the heads of which are in most cases appointed by the mayor with the consent of the aldermen for two years, viz.: finance, audit, treasury, collection, arrears, law, assessment, police and excise, health, fire and buildings, city works, parks, and public instruction. Besides the United States circuit and district courts for the eastern district of New York, the supreme court of the state for the second judicial district, and the county court of Kings county, which hold sessions here, there are the city court of Brooklyn, consisting of three judges, a police court, and six courts of justices of the peace. Brooklyn with the rest of Kings county elects three members of congress, and two senators and nine assemblymen in the state legislature. For police purposes the city is divided into 10 precincts and 8 sub-precincts. The department of police is under the control of a board of commissioners, consisting of a president and two other members. The force consists of a superintendent, an inspector, 10 captains, 51 sergeants, 25 roundsmen, 389 patrolmen, and 30 doormen, constituting the ordinary force, besides a superintendent of telegraphs with 3 operators, a detective force of 8 under command of a sergeant, 4 boiler inspectors, a drill captain, and a fire marshal. The pay of the superintendent is \$4,000 a year, of the inspector \$3,000, of the captains \$2,000 each, of the sergeants \$1,500, and of the patrolmen \$1,100. According to the latest report of the police department, the whole number of persons arrested during the 8 months ending Dec. 31, 1872, was 15,906, of whom 10,124 were foreign and 5,782 native born. The principal offences were: drunkenness, 6,421; assault, 3,204; disorderly conduct, 1,142; violation of city ordinance, 1,006; petit larceny, 718; grand larceny, 247; felonious assault, 242; burglary, 84; robbery, 22; murder, 14. Lost children recovered, 1,112; value of property recovered, \$77,316, of which \$75,805 was restored to owners. The fire department is under the control of a board, consisting of a president and two commissioners. The force consists of a chief and an assistant engineer, 6 district engineers, 16 steam fire engines, and 5 hook and ladder trucks, with a total of 189 men. The pay of the chief engineer is \$3,000 a year, of the assistant engineer \$2,000, and of the district engineers \$1,500 each; the other members of the force are paid from \$800 to \$1,000 a year each. There are 90 points in the city whence alarms may be transmitted by telegraph.—The city is supplied with water from a chain of ponds extending from Jamaica E. to Hempstead plains, whence it is brought in a brick-covered conduit to Ridgewood reservoir, into which it is forced by three powerful engines. The furthest of these ponds is 19 m. distant from the city hall. The Ridgewood reservoir is 170 ft. above the East river,

and has a capacity for about 160,000,000 gallons. Besides this, Mount Prospect reservoir has a capacity for 20,000,000 gallons, with an elevation of 28 ft. above that of Ridgewood. From these two reservoirs the water is distributed throughout the city. There are 277 m. of distribution pipes and 2,000 hydrants. The average daily consumption of water in 1872 was 24,000,000 gallons. To secure a supply of water in case of drought a storage reservoir at Hempstead is in process of construction; its estimated cost is \$1,393,743, and its capacity will be about 1,055,000,000 gallons. The bonds issued by the city on account of the water works amounted in 1873 to \$9,521,000; this department is self-sustaining. The water works are under the control of a board of city works, comprising three commissioners and a secretary, a chief engineer, water purveyor, register of water rates, and a general superintendent of sewers. This department also has charge of the sewerage and cleaning, paving, and repairing the streets of the city. In 1872 there were 546 m. of streets in the city, of which 283 m. were paved; the total length of sewers was 214 m. The 2d division of the national guard of the state of New York, consisting of the 5th and 11th brigades, has its headquarters here, and is composed mainly of citizens of Brooklyn. This force consists of 3 batteries of artillery, 3 troops of cavalry, and the 13th, 14th, 23d, 28th, 32d, and 47th regiments of infantry.—The city debt, Jan. 1, 1873, was \$32,012,884, and consisted of \$20,260,929 in bonds issued for public, and \$9,458,055 for local improvements, and certificates amounting to \$2,293,900. The city's quota of the county debt was \$3,471,977. Of the bonds issued for public improvements, the most important are \$3,738,000 public park loan, \$9,521,000 permanent water loan, \$2,100,000 East river bridge loan, \$726,000 Wallabout bay improvement loan, and \$345,000 Kent avenue basin loan. The property in possession of the city was valued at \$26,220,000. The amounts authorized to be expended during the year 1872 for city purposes were: principal of public debt, \$181,650; interest on same, \$877,600; principal of certificates, \$178,417; interest on same, \$9,748; salaries of city officers, \$245,000; board of health, \$25,000; general purposes, \$795,596; board of education, \$651,700; police department, \$518,640; fire department, \$332,417; water and sewerage department, \$190,000; park commission, \$75,000; resurveys, ward maps, &c., \$30,000; repairs to wells, pumps, &c., \$8,000; total for city purposes, \$4,058,768, of which \$3,375,062 was to be raised by taxation. The amount authorized for county purposes was: for quota of state tax, \$1,103,495; commissioners of charities, \$400,000; maintenance of parade ground, \$2,000; supervisors' budget, \$870,700; total for county purposes, \$2,376,195. The following table exhibits the valuation of property and taxation since the consolidation:

YEARS.	PROPERTY.		Tax.
	Real.	Personal.	
1855.....	\$34,574,848	\$10,216,857	\$152.82
1856.....	85,795,741	10,063,994	138.11
1857.....	87,848,795	11,168,668	178.94
1858.....	88,136,781	10,776,176	157.81
1859.....	90,082,122	10,970,518	134.29
1860.....	92,198,422	11,065,521	136.68
1861.....	93,582,519	11,495,374	243.29
1862.....	94,193,752	10,981,759	133.95
1863.....	99,674,808	12,568,920	174.73
1864.....	103,729,497	13,793,083	210.61
1865.....	106,434,858	16,944,475	274.95
1866.....	113,928,421	22,482,415	462.54
1867.....	122,932,284	20,262,581	542.25
1868.....	113,928,421	17,633,067	574.67
1869.....	179,118,331	17,544,980	650.18
1870.....	138,753,766	17,543,770	519.73
1871.....	187,631,591	18,245,561	572.34

—Prominent among the charitable institutions is the city hospital in Raymond street. Accommodations are afforded to those unable to pay, while private wards may be obtained at a moderate price. The L. C. Island College hospital occupies 14 lots at the junction of Pacific and Henry streets. Its plan embraces a hospital with an indoor and an outdoor department for the treatment of medical and surgical diseases; a lying-in department; a department for the regular education and licensing of nurses; and a college in which all the branches of medical science are taught. In 1870 it had 9 professors, 72 students, and 310 alumni. There are also St. Mary's female hospital in Clinton street, and St. Peter's hospital under the care of the Sisters of Charity; the eye and ear hospital, in Washington street, established in 1868; the dental infirmary, in Washington street, organized in 1870 to afford gratuitous dental treatment to the indigent; and six dispensaries. The female orphan asylum, corner of Clinton and Congress streets, had in 1871 530 girls under charge of 16 Sisters of Charity. Besides the Brooklyn orphan asylum in Cumberland street, which has accommodations for more than 150 children, and the Roman Catholic asylum recently erected in Albany avenue, with still greater accommodations, there are three other orphan asylums, one of which is for colored children. The Graham institution, corner of Washington and De Kalb avenues, for the relief of aged and indigent females, was founded in 1851 through the beneficence of John B. Graham, and has accommodations for 90 persons. The industrial school association and home for destitute children, organized in 1854, has a commodious building and 14 lots in Butler street, between Flatbush and Vanderbilt avenues; its mission is to reach children not attending other schools, and afford them instruction, and a home and clothing to the needy. The church charity foundation occupies a handsome building with 43 lots on the corner of Albany avenue and Herkimer street; its object is to afford a foundation upon which may be built up the different charities connected with the Episcopal church. The society for improving the condition of the poor is one of

oldest benevolent societies in the city, and designed to aid the poor by procuring them employment and temporary relief. There are numerous other charitable institutions, among which is the children's aid society, which opened a newsboys' home in 1866 and a children's home in 1867, affording to neglected boys in the city industrial training and places to sleep. The society embraces a special relief department for placing boys and girls in good homes; a sewing machine or girls' industrial department; and an industrial department and school for boys. The truant home, on the Jamaica Turnpike, has an average number of 100. Excellent accommodations are also afforded by charitable institutions of Kings county, which embrace the almshouse, hospital, nursery, lunatic asylum, &c., in Flatbush.—The common schools are classified as grammar and primary, there being no public high schools. They are under the control of a board of education of 45 members, and a city superintendent with an assistant. Under their supervision in 1872 there were 52 schools, of which 13 were primary and 5 were for colored children, besides the Protestant orphan asylum school, the church charity foundation school, the Catholic orphan asylum school for boys, the Catholic orphan asylum school for girls, and the Howard colored orphan asylum school. There are 52 school houses, of which 36 are built of brick and 16 of wood. For the school year ending Jan. 31, 1872, the number of teachers was 857, of whom 823 were females. The whole number of pupils enrolled during the year was 102,033, embracing 66,890 different pupils. Of this number 1,670 were colored. The average number registered was 40,935; average attendance, 36,044. These statistics are exclusive of the evening schools and orphan asylums. Seven evening schools for white and 10 for colored children were open during the weeks beginning with October, employing 26 male and 82 female teachers. The whole number of pupils, including 191 colored, was 6,001, of whom 4,429 were males and 1,572 females; average attendance, 2,198. The whole number of the preceding year was 5,416, with an average attendance of 2,071. The cost of maintaining these schools was \$13,164. In the orphan asylums 14 teachers were employed, the whole number of pupils being 1,049, with an average attendance of 818. The sum of \$11,100 was apportioned from the public school fund to these schools. The amount expended for the day schools for teachers' wages during the year was \$468,841, and \$8,095 for music teachers. The total amount expended for school purposes was \$719,800. There are about 35,000 volumes in the school libraries, valued at \$43,750. In addition to the public schools there are many excellent private seminaries. The Packer collegiate institute, which ranks among the first seminaries for females in the United States, was incorporated in 1853, and named after the late William S. Packer, by

whose widow the institution was liberally endowed. Its large Gothic structure in Joralemon street, with its grounds and boarding establishment, valued at over \$300,000, is insufficient for its wants. In 1872 it had 38 professors and teachers, besides special lecturers, between 700 and 800 students, and a library of more than 4,000 volumes. There are free and endowed scholarships for between 30 and 40 pupils. The collegiate and polytechnic institute for boys, in Livingston near Court street, founded in 1854, with a capital stock subsequently increased to \$100,000, is under the control of a board of 17 trustees. In 1872 it had 27 instructors, 597 students, and a library of 3,000 volumes. The juvenile high school, opposite the preceding, designed for the thorough instruction of boys under 12 years of age in the rudiments of an English education, has an average attendance of about 300. The Adelphi academy, founded in 1863, and incorporated as an endowed institution in 1869, has a fine building in Lafayette avenue, corner of St. James place, and receives pupils of both sexes to all grades except the collegiate. In 1873 it had 31 instructors and 552 pupils. Among others of importance are the Brooklyn Heights seminary, in Montague street, for the education of young ladies, and the college of St. John the Baptist (Roman Catholic), corner of Lewis street and Willoughby avenue. There are also three convents and a monastery.—The chief library is the mercantile, founded in 1857, which contains about 41,000 volumes, and is provided with a spacious reading room. The annual subscription for each member is \$5. The Brooklyn institute and youths' free library, liberally endowed by Augustus Graham, occupies a commodious building in Washington street, containing library, reading and lecture rooms, a public hall, and a picture gallery; it has about 12,000 volumes. The Long Island historical society, organized in 1868, has a library of nearly 20,000 volumes and an equal number of pamphlets, besides valuable treasures of art and history. The Brooklyn library association of the Eastern District had in 1870 over 8,000 volumes, and the law library in the court house is rich in that department of literature. The chief art institutions are the Brooklyn art association and the academy of design.—The chief places of amusement are the academy of music, in Montague street; the Brooklyn theatre, corner of Washington and Johnson streets; the Park theatre, in Fulton street, opposite the City Hall park; and the Olympic, which is devoted to varieties, and Hooley's opera house, to minstrelsy. The philharmonic society gives a series of classical instrumental concerts annually. There are four clubs: the Brooklyn social, which meets at the corner of Pierrepont and Clinton streets; the Long Island, political and social, corner of Clinton and Remsen streets; the Faust, established in 1871 chiefly for journalists, artists, actors, &c.; and the yacht club.—The young men's Christian association

of Brooklyn, organized in 1854 with 207 members, is in the front rank of similar institutions in the United States. In 1872 it occupied the elegant new building on the corner of Fulton street and Gallatin place, which is rented by the association, and is admirably adapted to the social enjoyment and instruction of the members. It is of architectural iron, four stories high; its dimensions are 100 by 75 ft. The first floor above the ground embraces the library, reading, prayer-meeting, and conversation rooms, a large, handsomely furnished parlor, and offices. The second and third floors are devoted to a hall for lectures, concerts, &c., with seats for 1,200 persons; also various class, music, and debating rooms. The library contains about 6,000 volumes, while the reading room is well supplied with newspapers and magazines. Prayer meetings are held every day and evening, daily instruction in all branches is afforded by numerous recitations and lectures, and frequent concerts are given. The number of instructors is 10. Much work is done by committees in distributing clothing and other articles among the needy, visiting the sick, &c. In January, 1873, the number of members was 8,700, and was rapidly increasing. The annual subscription for each member is \$2. There are two other local young men's Christian associations in the city. Three daily papers are published in Brooklyn, 1 semi-weekly in German, 6 weeklies, 1 bi-weekly, 1 semi-monthly, and 4 monthlies. There are 57 masonic lodges, 18 lodges and 3 encampments of odd fellows, 27 divisions of the sons of temperance, and 16 lodges of good templars.—The number of churches is 280, of which 88 are Methodist Episcopal, 36 Episcopal, 29 Baptist, 29 Presbyterian, 28 Roman Catholic, 18 Congregational, 15 Reformed, 11 Lutheran, 6 Methodist non-episcopal, 4 Jewish, 4 Universalist, 3 Unitarian, 2 Friends', 1 New Jerusalem, and 6 of other denominations. In 1870 the total number of church organizations of all denominations in Kings county was 276; edifices, 262; sittings, 197,125; value of property, \$12,025,000.—Brooklyn was settled by emigrants from Holland who had been sent out by the Dutch West India company to colonize New Netherland. The first settlement, according to Stiles ("History of the City of Brooklyn," 3 vols., 1867-'70), was made by William Adriaense Bennett and Jacques Bentyn, who purchased in 1636 from the Indians a tract of 930 acres of land at Gowanus, upon which a dwelling house was soon erected. In the following year John Jansen de Rapalje, one of the Walloon emigrants who settled at New Amsterdam in 1623, purchased a tract of land where the navy yard now is, which, however, he did not occupy as a residence till 1654. In the mean time others, many of whom were Walloons, settled in this locality, which became known as the Waal-bogt, afterward corrupted to Wallabout. In 1646 nearly the whole water front from Newtown creek to the S. side of Gowanus bay was held by individ-

uals who were engaged in its cultivation. Settlers under patents from the Dutch West India company had established themselves between Flatbush and the "Ferry," along what is now Fulton street, S. E. of the present city hall, and the settlement thus formed was called Breuckelen, after the village of that name near Amsterdam in Holland. In 1646 the town was organized by Gov. Kieft, who appointed Jan Eversen Bout and Huyck Aertsen as schepens, or superintendents, to preserve the peace and regulate the police of the community. In 1667 Gov. Richard Nicolls granted a full and ample patent to certain inhabitants of Breuckelen, their heirs, successors, and assigns, of all land acquired, or to be purchased or acquired, on behalf of the town, from the Indians or others. This patent was confirmed by Gov. Dongan in 1686, in consideration of an annual quitrent of 20 bushels of good merchantable wheat. This quitrent, or its equivalent, continued to be paid by the town as late as 1786. Brooklyn was the scene of several memorable events during the revolution. On Aug. 27, 1776, the battle of Long Island was fought. (See LOSS ISLAND.) From this time until November, 1784, Brooklyn was occupied by the English. In 1776, and for six years thereafter, until New York was evacuated, several condemned hulks were moored in the Wallabout, and used for the detention of American seamen captured by the British. It is estimated that 11,500 Americans died on these plague ships. The shores of the Wallabout were full of dead men's bones, and for many years the tides washed out the remains from the sand. After some years of agitation, the bones were finally collected in 1868, and laid in a vault near the navy yard, with imposing ceremonies. In 1873 they were transferred to a vault constructed for the purpose in Washington park, where it is also proposed to erect a monument to the memory of the martyrs. For many years after the settlement of Brooklyn, its inhabitants worshipped in New Amsterdam. In 1655 a church was erected in the neighboring town of Midwout, or Flatbush, for the accommodation also of Brooklyn and Amersfoort. The Rev. Mr. Polhemus was the pastor of this church. In 1660 the Rev. Henry Selwyn (otherwise Henricus Selyns), of Holland, was installed as pastor of the congregation in Brooklyn. The first church edifice in Brooklyn was erected in 1666, in the middle of the highway, now Fulton street, near Lawrence. Its successor is the first Reformed church in Joralemon street, erected in 1835. The Episcopal church of Brooklyn was incorporated by act of the legislature in 1787. In 1795 the church was reorganized and incorporated under the name of St. Ann's church. The first Methodist church was incorporated in 1794; the first Presbyterian, Baptist, and Roman Catholic churches in 1822; and the first Congregational church in 1839. The earliest ferry between Long Island and New Amsterdam was, according to Stiles, established as early as 1642, and

nected the present Fulton street, Brooklyn, what is now Peck slip, New York; these streets were for more than a century the principal ferry landings. The first steam ferry boat on the Nassau, which began running in 1814. Brooklyn was incorporated as a village in 1816, became a chartered city in 1834. On Sept. 1848, occurred the largest fire in its history, consuming seven blocks in Fulton and adjoining streets, between Poplar and Concord streets. Jan. 1, 1855, it was consolidated with the town of Williamsburgh and the town of Bushwick (including the village of Greenpoint) under the common name of Brooklyn; what had formerly been called Brooklyn being designated the Western District, and the other portion the Eastern District. Williamsburgh was ruled by Richard W. Woodhull, who at the opening of this century settled near Bushwick (now North Second). It was incorporated as a village in 1827, and as a city in 1851. In 1855 its population was 48,367. The streets of Brooklyn were first lighted by gas in 1848, and water was introduced in 1855. There was a volunteer fire department from 1786 to 1869, when the paid department was organized. A commission is now (September, 1873) engaged in arranging the terms of annexation of the city of Kings co. to Brooklyn. (See KINGS.)

BROOKS, a S. county of Georgia, on the Florida border, bounded S. E. by the Withlacoochee river, and watered by its tributaries and the Ocella river; area, 550 sq. m.; pop. in 1870, 12,200, of whom 4,231 were colored. The Atlantic and Gulf railroad passes through it. The chief productions in 1870 were 171,190 bushels of Indian corn, 45,716 of oats, 24,574 of peas and beans, 32,445 of sweet potatoes, and 3,466 bales of cotton. There were 491 horses, 2,618 head of cattle, 5,578 other cattle, 4,924 sheep, and 1,087 swine. Capital, Quitman.

BROOKS, Charles Shirley, an English author, born at Brill, Oxfordshire, about 1815. He studied law, but devoted himself to literature. Two of his plays, "Our New Governor" and "The Role," were quite successful. He became a parliamentary reporter on the "Morning Chronicle," and was sent to Turkey, Egypt, and southern Russia to investigate the condition of the British colonies. His letters from Russia have been issued in book form. In 1855 he published "Aspen Court," which has been followed by the other successful novels, "The Gordian Knot," "The Silver Cord," and "Sooner or Later." He is a keen satirist in prose and verse, and on the death of Mark Lemon, in 1860, he became editor of "Punch," to which he had been an early and frequent contributor, as well as to the "Illustrated London News."

BROOKS, Charles Timothy, an American author, born in Salem, Mass., June 20, 1813. He graduated at Harvard college in 1832, and in 1837 was settled as a Unitarian clergyman in Newport, R. I., where he has ever since resided. He published there in 1851 a pamphlet entitled "The Controversy touching the Old

Stone Mill." He is an accomplished scholar, and especially devoted to German literature. He has published a translation of Schiller's "William Tell;" a volume of miscellaneous poems from the German, in the series of "Specimens of Foreign Standard Literature;" a translation of Schiller's "Homage to the Arts," &c.; "German Lyrics;" "Songs of the Field and Flood;" a translation of Goethe's "Faust;" translations of "Titan," "Hesperus," and other works of Richter; besides a romance, poems, and a volume of sermons.

BROOKS, I. James, an American journalist and politician, born in Portland, Me., Nov. 10, 1810, died in Washington, D. C., April 30, 1873. At the age of 11, having lost his father, he was placed in a store, at 16 became a school teacher, and in 1831 graduated at Waterville college, at the head of his class. He was next principal of the Latin school in Portland, then travelled through the southern states and among the Creek and Cherokee Indians, wrote letters to various journals, became the correspondent at Washington of several papers, and was the originator of the system of regular Washington correspondence. Becoming in 1835 a member of the legislature of Maine, he introduced the first proposition for a survey for a railroad from Portland to Montreal and Quebec. The same year he visited Europe, travelling on foot over a great part of the continent and the British islands, and gave an account of his adventures in a series of letters to the "Portland Advertiser." On his return in 1836 he established the New York "Express," of which for many years both a morning and evening edition were published, but which is now exclusively an evening journal. In 1847 he was elected as a whig to the assembly of the state of New York, and in the following year chosen a member of congress from New York city, in which post he was continued by reelection till 1853. In congress he took part in favor of the passage of the compromise of 1850, and there and in his newspaper advocated the principles of the American party. Soon after the outbreak of the civil war he joined the democratic party, by whom in 1864 he was again returned to congress from the city of New York, and remained a member till his death, having received four successive reelections. In 1871 he made a rapid tour of the globe, of which he gave an account in a volume entitled "A Seven Months' Run up and down and around the World" (New York, 1872). **II. Erastus**, an American journalist, brother of the preceding, born in Portland, Me., Jan. 31, 1815. He was sent to Boston at the age of eight, where he was employed in a grocery store, and obtained the rudiments of learning at an evening school. He subsequently became a printer, and published a newspaper called "The Yankee" at Wiscasset, Me. Afterward, having graduated at Brown university, he became the principal of a grammar school at Haverhill, Mass., and editor of the "Haverhill Gazette." In 1836 he was en-

gaged as Washington correspondent of the New York "Daily Advertiser" and of several New England journals, and soon afterward became with his brother joint editor and proprietor of the New York "Express," which position he still retains (1873). In 1843 he travelled extensively in Europe, and in 1853 and 1855 he was elected to the New York state senate. While in the senate he advocated a bill divesting the Roman Catholic bishops of the title to church property in real estate, and became in consequence involved in a controversy with Archbishop Hughes, which was published in a volume ("Controversy on Church Property," New York, 1855). In 1856 he was nominated for governor of New York by the American party, but was not elected. He subsequently joined the democratic party. In 1872 he was appointed member of a commission to revise the state constitution.

BROOKS, James Gordon, an American poet, born at Claverack, N. Y., Sept. 3, 1801, died in Albany, Feb. 20, 1841. He graduated at Union college in 1819, studied law, and removed in 1823 to New York, where he became editor of the "Minerva," a literary journal, and afterward of the "Literary Gazette," the "Athenæum," and the "Morning Courier," continuing in all these papers the publication of his verses. In 1828 he married Mary Elizabeth Aikin of Poughkeepsie, and the next year appeared "The Rivals of Este and other Poems, by James G. and Mary E. Brooks." The year after they removed to Winchester, Va., and in 1838 to Rochester, N. Y., and afterward to Albany. Mary E. Brooks, his wife, in addition to her literary abilities, was a skilful designer. The original drawings for the plates in the "Natural History of the State of New York," edited by her brother-in-law Mr. James Hall, were made by her from nature.

BROOKS, John, M. D., an American officer, born at Medford, Mass., May 31, 1752, died March 1, 1825. Having settled at Reading as a physician, he undertook the drilling of a company of minute men, with whom, on the news of the expedition to Lexington, he marched in time to see the retreat of the British. Promoted soon after to the rank of major in the continental service, he was especially serviceable to the army as a tactician. He was made lieutenant colonel in 1777, and in the battle of Saratoga stormed the intrenchments of the German troops. He was a faithful adherent of Washington during the conspiracy at Newburgh. After the peace he resumed the practice of the medical profession in Medford, and was for many years major general of the militia of his county. In 1816 he was elected governor of Massachusetts, and was reelected annually till 1823, when he declined being again a candidate.

BROOKS, Maria, an American poetess, known also by the name of "Maria del Occidente," which she first received from Robert Southey, born at Medford, Mass., about 1795, died at

Matanzas, Cuba, Nov. 11, 1845. Her family were Welsh, her maiden name being Gowen. Having lost her father while young, she attracted the regard of Mr. Brooks, a Boston merchant, who completed her education at his own expense, and afterward married her. She published nothing till 1820, when "Judith, Esther, and other Poems" appeared. On the death of her husband in 1823 she removed to Cuba, where she came into possession of some property, and where she finished her principal work, "Zophiel, or the Bride of Seven," the first canto of which was published in Boston in 1825. In 1830 she visited Paris and London, still improving her work, which appeared in London in 1833. In 1843 she published "Idomen, or the Vale of Yumuri." Her "Ode to the Departed" was written in 1843.

BROOKS, Peter Chardon, an American merchant, born at Medford, Mass., Jan. 6, 1767, died in Boston, Jan. 1, 1849. His boyhood was passed upon a farm. He afterward went to Boston, and engaged in the business of marine insurance, acquiring an ample fortune, and was for several years president of the New England insurance company. In 1803 he retired from business, and became active in various benevolent enterprises. He was a member of the first municipal council of Boston after its incorporation as a city, and at different times a member of the executive council and of the senate and house of representatives of Massachusetts. In the legislature he took a prominent part in urging the measure for suppressing lotteries.—See "Life of P. C. Brooks," by Edward Everett, in Hunt's "American Merchants."

BROOKS, Phillips, an American clergyman, born in Boston, Dec. 13, 1835. He graduated at Harvard college in 1855, studied theology at the Protestant Episcopal seminary in Alexandria, Va., and from 1859 to 1870 was rector of churches in Philadelphia. In the latter year he became rector of Trinity church, Boston. He is noted as one of the most brilliant pulpit orators of the Episcopal denomination.

BROOKS, Preston S., an American politician, born in Edgefield county, S. C., Aug. 4, 1819, died in Washington, Jan. 27, 1857. He graduated at South Carolina college in 1839, was elected to the legislature in 1844, and in 1846 raised a company for the Mexican war and led it as captain in the Palmetto regiment. He was elected to congress in 1853. Mr. Sumner of Massachusetts, having in a speech in the United States senate used expressions which were considered by the pro-slavery members of congress highly offensive to the South, and South Carolina in particular, was on May 22, 1856, violently assaulted in the senate chamber by Mr. Brooks, and beaten on the head with a cane. A committee of the house of representatives reported in favor of the expulsion of Mr. Brooks; but the report failed to receive the requisite majority of two thirds. He was indicted for assault, pleaded guilty, was sen-

ed to pay a fine of \$300, and resigned his in congress, but was reflected without position. He died suddenly from acute inflammation of the throat.

BROOM, a genus of plants, consisting of shrubs small trees, with leaves in threes and yellow or purplish white flowers, belonging to natural order *leguminosae*. The common

om, the *spartium* *scoparium* of Linnaeus, and the *cytiscus* *ariarius* of Lamarck, a bushy shrub, smooth, angular, green branches, yellow, butterfly-shaped, axillary blossoms, and is common sandy heaths in Britain. Bunches of its twigs make brooms for sweeping. Roasted seeds are sometimes used as coffee. The fibres of the bark, separated by soaking, may be manufactured into cordage.

Section of its tops have been celebrated as a medicine for dropsy, but, though often efficacious as a diuretic, it is not certain in its operation. The *spartium junceum*, or Spanish broom, is a native of Spain, abundant in Valencia, and is supposed to be the plant which, according to Pliny, overspread whole mountains near New Carthage (Cartagena). Its seeds and bark are manufactured into carpets, various implements, and are articles of merchandise. It is cultivated as an ornamental shrub in gardens.

BROOM CORN (*sorghum saccharatum*), a plant which is a native of India, and is cultivated in Europe and America, having a jointed stem like a reed, usually rising to the height of from 6 to 10 ft., bearing an effuse spike, of which brooms are made. It has yellow oval seeds, numerous oblong florets, and broad lanceolate leaves. The introduction of broom corn as an agricultural product into this country is attributed to Dr. Franklin. He is said to have accidentally seen an imported whisk of corn in the possession of a lady of Philadelphia, and while examining it as a curiosity saw a seed, which he planted, and from this small beginning has sprung the present product of this article in the United States. The cultivation of broom corn is now very extensively carried on in most parts of the United States, especially some branches of the society of Shakers, the manufacture of it into brooms is an important industry. The seed of the broom corn is excellent for fattening sheep. It is also sown with advantage to horses and poultry, and is sown ground with Indian corn, rye, oats, or

barley, to cattle. Ground and mixed with wheat bran, it is good for milch cows. It is considered by some to be worth as much per bushel, when fully ripened and well cured, as Indian corn. It may be dried on barn or garret floors, and the ground is often used for the purpose. Frequent stirring, while drying, is essential. It should be run through a fanning mill before grinding. As to the yield of seed, it is somewhat precarious; yet it will often more than pay the whole expense of cultivation and preparing the crop for market. In some cases 150 bushels of good seed have been obtained from an acre, but this is a rare yield. The harvesting of the crop most generally commences while the seed is in its earliest stage, or milky state, as the early harvested broom is the brightest and best; consequently there must be a sacrifice of more or less seed. Alluvial lands are the best for raising broom corn; yet almost any soil that will raise good maize will produce a tolerable crop of broom. It will pay well for manuring and for careful culture. No crop is more beautiful in appearance than the standing corn, when in perfection. It often attains to a height of 12 or 15 ft. The stalks of the plant are long and hard, and are considered of but little consequence, except for manure. However, cattle having access to them before the frost will feed well upon their leaves.—The planting is generally done with a machine, drawn by a horse, in rows 8 ft. apart, wide enough for the cultivator or plough to pass conveniently. The seed is dropped in hills from 16 to 18 inches apart, four quarts of seed being sufficient to plant an acre. The seed will germinate and the blade make its appearance in four or five days, if the weather is favorable and the soil productive.



Broom (*Spartium scoparium*).



Broom Corn (*Sorghum vulgare*).

It may be manured in the hill, or by spreading the manure upon the ground, or in both ways if high cultivation is desired. One man, with

a horse and a machine that will plant two rows at the same time, may plant from 10 to 12 acres in a day. The labor of one hand four months will cultivate about six acres, and harvest the same, and the average produce per acre is about 500 lbs. After the corn is well up, the cultivator can be profitably used three or four times before hoeing, after which commences the weeding and thinning. As a general rule, two hoeings are sufficient. At the last time, and when the corn is 10 or 12 inches high, the Shakers use a double-moulded plough, which turns a furrow each way. Planting may be performed with safety from the middle of May to the 1st of June, and even later if the season is good. The usual practice in harvesting is to bend the stems or stalks of the corn some 2½ or 3 ft. from the ground, and leave them for a few days to dry. They are then cut 6 or 8 inches from the brush, and laid into heaps, ready to be carried to the scraper. The seed is removed from the brush by various methods, from the best horse-power scraping machines, by which the brush of three acres of corn may be cleaned in a day, down to the original hand machines of the simplest construction. That part of the stalk still remaining in the field should be ploughed under during the fall, or in the following spring. The practice of the Shakers is to break them down with a heavy drag in the spring following, and plough them under, and then run over the ground with a large roller, which process prepares the land again for planting. Some carry their stalks into the cattle or sheep yards, where they become incorporated with the manure, and thereby make a valuable addition to the compost.—When the broom corn was first introduced by the united society of Shakers in Watervliet, N. Y., in the year 1791, it was raised in the garden as other corn. In 1798 it began to excite attention, and some new brooms were manufactured by them for the market, and sold at the price of 50 cents each. The handles were made of soft maple timber, and turned in a common foot lathe. The machinery for manufacturing the brooms was very simple. It consisted of nothing more than a roller or cylinder of wood, turned by a short crank for the purpose of winding on the cord or twine; and by placing one or both feet against this cylinder, the tightness of the twine was governed, and the broom made by holding the handle in one hand, and applying the brush with the other, while winding. The next process, by way of improvement, some few years after, was the addition of a bench to the roller, in a frame fastened to the bench, and a rag-wheel to hold the cord when wound upon the roller by a short crank as before. Nearly all the Shakers' societies in the United States are more or less engaged in this branch of employment; but the societies at Watervliet, N. Y., and that at Union village, O., carry it on the most extensively. The census of the United States for 1870 gives no statistics respecting broom corn.

BROOME, a S. county of New York, bordering on Pennsylvania; area, 680 sq. m.; pop. in 1870, 44,108. It is drained by the E. branch of the Susquehanna, the Chenango, Otsego, and other smaller streams, and traversed by the New York and Erie, the Syracuse and Binghamton, the Albany and Susquehanna, and the Delaware, Lackawanna and Western railroads, and the Chenango canal. The surface is uneven. The valleys are fertile, but the uplands are only fit for grazing. The chief productions in 1870 were 84,926 bushels of wheat, 160,602 of Indian corn, 783,387 of oats, 450,028 of potatoes, 101,955 tons of hay, 2,961,378 lbs. of butter, 72,137 of wool, and 164,809 of hops. There were 7,547 horses, 24,649 milch cows, 14,387 other cattle, 20,124 sheep, and 8,201 swine. Capital, Binghamton.

BROOME, William, an English author, born in Cheshire in 1680, died in Bath, Nov. 16, 1745. In conjunction with Fenton he aided Pope in the translation of the *Odyssey*. He translated books 2, 6, 8, 11, 12, 16, 18, 23; Fenton, 1, 4, 19; the remaining 12 being by Pope. Broome also compiled the notes, and he received £500 for his whole work. He also published some indifferent poetry of his own.

BROSSES, Charles de, or Debrosses, a French author, born at Dijon, Feb. 17, 1709, died in Paris, May 17, 1777. He was early proficient in science, jurisprudence, and literature, spent some time in Italy, was president of the parliaments of Dijon and Burgundy, and a member of the academy of inscriptions and belles-lettres; but having excited the enmity of Voltaire by criticising his *Dictionnaire philosophique*, he was not admitted to the French academy. His principal works are: *Lettres sur l'état actuel de la ville souterraine d'Herculanum*, the earliest publication on that subject (Dijon, 1750); *Histoire des navigations aux terres australes*, written at the request of Buffon, and introducing for the first time the designations Australasia and Polynesia (2 vols., 1756); *Traité de la formation mécanique des langues* (2 vols., 1765); and a collection of about 700 passages of Sallust, with elaborate comments, under the title of *Histoire du septième siècle de la république romaine* (3 vols., 1777). The last volume included a small portion of the original text, the publication of the rest, which was to form a quarto volume, being prevented by his death. *Le président de Brosses, histoire des lettres et des parlements du 18^{me} siècle*, was published in 1842.

BROSSET, Marie Félicité, a French orientalist, born in Paris, Feb. 5, 1802. He was educated for the church, and for three years was a teacher in Jesuit colleges, but abandoned theology and devoted himself to the Semitic and other eastern languages, composing a grammar and dictionary of the Georgian language out of the Georgian version of the Bible, and eking out a scanty subsistence by type-setting and proof-reading. He accepted an assistant professorship of Armenian and

Georgian in the imperial academy of sciences in Petersburg, where he became academician, councillor of state, inspector of primary schools, director of the principal public library, and in 1811 custodian of the collection of oriental manuscripts at the Hermitage palace. He prepared eight volumes (the 18th to the 21st) of the new edition of Lebeau's *Histoire du Bas Empire*, enriching it with original material from oriental sources, and published many geographical, archaeological, and historical works relating to Georgia and Armenia, the principal being *Histoire de la Géorgie* (2 parts, St. Petersburg, 1809-'37) and *Ruines d'Ani, capitale de l'Arménie sous les rois Bagratides aux X^e et XI^e siècles* (2 vols., 1860-'61). His *Rapport sur un voyage archéologique dans la Géorgie et l'Arménie* (St. Petersburg, 1849-'51) narrates an expedition to the Caucasus, Georgia, and Armenia, undertaken under the auspices of the Russian government. He also contributed to Duboinoff's Georgian-Russian-French dictionary, to the bulletins and memoirs of the St. Petersburg academy, and to the *Journal Asiatique* of Paris, and translated from Armenian to French Strikhanoff's *Histoire de Siounie* (St. Petersburg, 1864).

BROTHERS, Richard, an English fanatic, born about 1758, died in London, Jan. 25, 1824. He had been a lieutenant in the British navy for several years, and quitted the service in 1789. Declining to take the usual oath to enable him to draw his half pay, he was in 1790-'91 reduced to great straits, being forced for a time to live in the workhouse. He styled himself "nephew of the Almighty and prince of the Hebrews," appointed to lead them to the land of Canaan," and in 1792 sent letters to George III., the ministry, and the speaker of the house of commons, announcing the fulfilment of the 7th chapter of Daniel. In 1794 he published a book, in two parts, called "A Revealed Knowledge of the Prophecies and Prophecies," Having prophesied the death of the king and the destruction of the monarchy, and retold that the crown was to be delivered to him, he was imprisoned for some time in Newgate. His disciples were not confined to the poor and ignorant, but included Halhed, the Orientalist; William Sharp, the engraver, who executed his portrait, inscribing under it, "Fully believing this to be the man appointed by God, I engrave his likeness;" and other persons of distinction. Many of his followers sold their goods to be ready to accompany him to the New Jerusalem, which was to be built on both sides of the Jordan, and which he was to reach in 1795. Jerusalem was to become the capital of the world, and when the Jews were fully restored, in 1798, he was to be re-elected as the prince and ruler of the Jews, and governor of all nations. At last Brothers was committed to Bedlam as a dangerous lunatic. After some delay, application was made to Lord Chancellor Erskine, who granted an order for release on April 14, 1806. Mr. Finlayson,

one of his disciples, then removed him to his own house, where he resided during the last years of his life. Mr. Finlayson, who retained his belief in the mission of Brothers, related these facts in 1848.

BROUCKÈRE. I. Charles Marie Joseph Ghislain de, a Belgian statesman, born at Bruges in 1796, died April 20, 1860. He was educated at the polytechnic school of Paris, entered the Dutch army as sub-lieutenant, but retired in 1820, and was employed in a banking house. In 1825 he was elected deputy to the states general, and at once enlisted in the ranks of the liberals. After the breaking out of the revolution of 1830 he was at the head of the financial department in the provisional government, and suggested the nomination of the duke de Nemours to the throne. Nevertheless, on the election of Leopold, he was called to the ministry of the interior, and subsequently the war ministry was forced upon him. On the opening of the university of Brussels he accepted one of the professorships, declining the salary. From 1835 to 1838 he was president of the Belgian national bank. In 1848 he was again chosen deputy, and soon afterward mayor of Brussels. He had the title of count offered to him by the king in 1857, but declined it. He was an opponent of the Catholic party, and of a protective tariff. **II. Henri Marie Joseph Ghislain de**, brother of the preceding, born at Bruges in 1801. He was attorney general at Roermonde when the revolution of 1830 broke out, in which he took an active part as a volunteer in the army, and as a member, and afterward as secretary, of the national congress. He was one of the commissioners sent to England in 1831 to offer to Leopold the Belgian crown. His most important act as a legislator was the revision of the criminal code, including the abolition of capital punishment.

BROUGHAM, Henry, Baron Brougham and Vaux, lord chancellor of England, born in Edinburgh, Sept. 19, 1779, died in Cannes, France, May 9, 1868. He was descended from an ancient Westmoreland family, and was through his mother the grand-nephew of William Robertson, the historian. He was educated at the high school and university of Edinburgh, where he was distinguished for his devotion to mathematics and physical science. Before he was 20 he wrote several papers which appeared in the "Transactions of the Royal Society." He subsequently travelled on the continent, and was admitted a member of the Edinburgh society of advocates in 1800. He was a member of the "Speculative Club," a debating society which brought him into contact with Horner, Jeffrey, and others, afterward distinguished; and in 1802 he helped to start the "Edinburgh Review," to which he was an assiduous and able contributor for a quarter of a century. In 1803 was published his "Inquiry into the Colonial Policy of the European Powers," which drew much attention. He was called to the bar at Lincoln's

Inn in 1808, and chose the common law courts and the northern circuit. In 1810 he entered parliament as member for Camelford, a rotten borough under the influence of the duke of Bedford. One of his first steps was to introduce a resolution requesting the king to take decisive measures for the suppression of the slave trade. During the next two years he spoke in favor of Roman Catholic emancipation and of reform in the government of India, and in condemnation of flogging in the army. He had previously acquired great popularity by opposing the "British orders in council," and in 1812 was efficient in procuring their repeal. In that year he offered himself as candidate for Liverpool, and was defeated by George Canning, and afterward failed as candidate for Inverkeithing. In 1816 he was returned for the borough of Winchelsea, of which the earl of Darlington was owner; he represented this borough until 1830. He commenced his efforts in the cause of popular education in 1816 by obtaining the appointment of a committee to inquire into the state of the education of the poor in the metropolis. In 1818 he succeeded in getting a commission appointed to inquire into the abuses of the public charitable foundations of the kingdom connected with education, which resulted in the nomination of a permanent commission to supervise the administration of such charities. His "Letter to Sir Samuel Romilly, upon the Abuse of Public Charities," which was published in 1818, ran through ten editions. In 1820 and 1821 he was engaged as counsel of Queen Caroline in her contest with George IV., and gained great popularity by his course in that case. In 1828 he helped to found the London mechanics' institute. In 1825 appeared his "Practical Observations upon the Education of the People, addressed to the Working Classes and their Employers," of which 20 editions were sold. In the same year he was elected lord rector of Glasgow university over Sir Walter Scott, and introduced a bill for the incorporation of the London university, of which he was one of the most active promoters. He was also one of the founders of the "Society for the Diffusion of Useful Knowledge," started in 1827. Mr. Brougham was elected chairman of the managing committee, and his discourse on the "Objects, Pleasures, and Advantages of Science" was the society's first publication. Between 1825 and 1830 he spoke frequently in parliament on law reform, Catholic relief, colonial slavery, and the corporation and test acts. His speech of Feb. 7, 1828, in behalf of law reform, indicated the necessity of almost all the legal reforms which have been effected in England since that period. During the short administration of Mr. Canning, that statesman received Mr. Brougham's support on account of "his liberal and manly foreign policy." In 1830 he resigned his seat for Winchelsea, on the ground of disagreement with his patron, the marquis of Cleveland, and was immediately afterward

returned for Knaresborough through the influence of the duke of Devonshire. At the general election, which ensued upon the accession of William IV., Brougham stood for Yorkshire, and was returned free of expense. At this time he occupied the position of leader of the British people in their efforts for parliamentary reform. On the formation of the ministry of Earl Grey, he became lord chancellor, with the title of Baron Brougham and Vaux, which was conferred on him in November, 1830. In his judicial capacity he was noted for the rapidity of his decisions, which nevertheless were generally accurate. With Earl Grey he bore the principal part in advocating the reform bill in the house of lords. Mr. Roebuck, in his "History of the Whig Party," says that it was owing to Lord Brougham's astonishing audacity and menaces that William IV. was induced to dissolve the house of commons in 1831. All the measures of reform passed by the first reformed house of commons received Lord Brougham's support in the house of lords. The dismissal of the whig ministry in November, 1834, put an end to his chancellorship and his official life. After that time he took an active part in the determination of appeals to the house of peers, was often in antagonism to the whigs, and censured their Canadian policy. His zeal for popular education, the abolition of slavery, the suppression of the slave trade, the repeal of the corn laws, and law reform never slackened. In 1839 he became proprietor of the villa Louise Eléonore, on a beautiful estate in the south of France, near Cannes, overlooking the Mediterranean—his estate in England being Brougham hall, Perith, Westmoreland, and his London residence No. 4 Grafton street. As an orator Lord Brougham was in his time second only to Canning. In 1833 he was elected a foreign associate of the institute of France, and later of the royal academy of sciences of Naples, and in 1859 was made chancellor of the university of Edinburgh. In 1857 he founded the national association for the promotion of social science, and in 1862 the working men's club and institute union. In 1850, '52, and '53 he made experiments on the properties of light, which were communicated to the British royal society and the academy of sciences at Paris, and published in the transactions of both. In 1855, conjointly with E. J. Routh, he published "An Analytical View of Sir Isaac Newton's Principia." Soon after his loss of office he brought out, in conjunction with Sir Charles Bell, an annotated edition of Paley's "Natural Theology." In 1839-'43 appeared his series of "Sketches of Statesmen who flourished in the time of George III.," and in 1845 his "Lives of Men of Letters and Science who flourished in the time of George III." His "Speeches on Social and Political Subjects," with a historical introduction, appeared at London and Glasgow in 1857, in 2 vols. 12mo. Among the later productions of Lord Brougham are a valuable dissertation,

by him, May 18, 1858, before the French Academy, on "Analytical and Experimental Studies on the Cells of Bees," and his speech, read June 17, 1858, in the house of lords, in support of the suppression of the slave trade. A complete edition of his works, in 10 volumes, was published in 1857 under his own supervision; after his death appeared "The Life and Works of Lord Brougham, written by Himself" (London and New York, 1871). A work ascribed to him, entitled "Lunel," was published in 1872.

BROUGHAM, John, an Irish actor and playwright, born in Dublin, May 9, 1810. He was trained for the medical profession, but the prospect of a government clerkship took him to London, where, being disappointed in this, he gave lessons in drawing for some time, and finally became an actor at the Olympic Theatre, and subsequently at the Haymarket, where he made a very successful first appearance in June, 1832. In 1842 he came to America, appeared at the Park theatre, New York, and subsequently performed in almost every theatre in the Union. Having managed a theatre in Boston, he built the Lyceum (after Wallack's) in New York in 1850, but relinquished it at the end of two seasons. He managed the Bowery theatre, New York, 1856-7. About 1860 he visited England, remaining in 1865, since which time he has been mainly engaged in New York. Mr. Brougham is the author of various comedies, farces, and extravaganzas, the most popular of which are "Pocahontas," "Romance and Comedy," "My Cousin German," "David Copperfield," "Dombe and Son," adapted from Dickens, and "The Lily of France" (1872). He has collected some of his fugitive prose stories and articles into two volumes, called "A Basket of Chips" and "The Bunsby Papers."

BROUGHAM, Lord. See HOBHOUSE.

BROUSSAIS. See BRUSA.

BROUSSAIS, François Joseph Victor, a French physician, born at St. Malo, Dec. 17, 1772, died at Meudon, near Paris, Nov. 17, 1838. His early studies were passed at a small village where his father was a physician. At the age of 12 he went to school at Dinan, where he was pursuing his studies when the revolution broke out in 1789. He was enrolled as a volunteer, and joined the army. After two years he obtained leave to return home, on account of illness. On his recovery he became a student of medicine, and obtained a commission as surgeon on a ship of war. He held an appointment at Brest from 1795 to 1798; but being anxious to pursue a course of study at Paris, he moved there in 1799. He obtained an appointment as military surgeon in 1804, and two years later was sent to the camp at Boulogne; the project of invading England being abandoned, the army was turned against Austria, and Broussais went with it in all its campaigns. In 1808 he obtained leave to go to Paris to superintend the publication of his *Histoire des phleg-*

masies chroniques. This work, which contains the germs of all his future doctrines, met with little notice at the time; for, although Pinel praised it highly, and it was honorably noticed by the institute, nearly the whole edition remained unsold till 1816. Soon after this publication, in 1808, he was appointed chief physician to a division of the French army in Spain, where he remained six years, pursuing his researches and attending to the duties of his office. In 1814 he was appointed assistant professor at the military hospital of the Val de Grâce in Paris. He commenced a course of lectures on practical medicine, in which he attempted to form a system and a school of his own, in opposition to the doctrines of Pinel, then taught in the established schools of medicine. His lectures were attended by great numbers of students, who accepted his ideas with enthusiasm. In 1816 he published his *Examen de doctrine médicale généralement adoptée, &c.*, which excited the opposition of the whole medical faculty. By degrees his doctrines gained approval, and were taught in the medical school itself long before 1832, when Broussais was appointed professor of general pathology in the academy of medicine, which office he held until his death. Besides the two works above mentioned, he published in 1824 his *Traité de la physiologie appliquée à la pathologie*; in 1829, his *Commentaires des propositions de pathologie consignées dans l'examen*; in 1832, *Le choléra morbus épidémique*.—The life of Broussais presents three distinct periods. In the first, he labored to prove that the doctrines of Pinel with regard to the essentiality of fever were erroneous, and that some morbid agent, producing irritation and inflammation, was the cause of all disease. From 1816 to 1821 he was successfully occupied in controverting the established theories from this point of view. His followers then complained that he had shown the fallacy of Pinel's theory, but had not sufficiently elaborated a new doctrine to replace it. From 1821 to 1828 he labored to establish what he called the "physiological system of medicine," in opposition to the "ontological" system of Pinel. The "History of Chronic Inflammations" had prepared the way for his theory of irritation in the organs, corresponding to a principle of irritability in the organism. He therefore proclaimed this doctrine as the basis of all medical truth, and sustained his views with ability and general success from 1821 to 1828. It was the doctrine taught by Brown in Edinburgh more than 30 years before, and had already met with much success in England, Germany, and Italy, though little known in France until revived by Broussais under a new form. For seven years Broussais had immense success in France and Belgium, where this theory was practically new. In England and Germany it met with less success, because it had been known as the doctrine of Brown; and though very true in many points, it was nevertheless insufficient to

explain all the phenomena of health and disease. The same opinion arose in France after a seven years' practical trial of the system; and after being greatly lauded and admired, Broussais was deserted by the students and professors of medicine. The partial truth of his views was admitted, but other principles and doctrines were needed to explain the physiological and pathological phenomena of life. In nervous diseases it afforded no assistance, but left the student as much in the dark as he was before; and this was admitted by his own partisans, and partly by Broussais himself. To make his system more complete, he undertook a series of observations on the nervous system, and its relation to psychology. Although he had been up to that time more or less opposed to phrenology, he turned his attention to the subject, gave public lectures on it, and in 1836 published an octavo volume under the title of *Cours de phrénologie*. This work had a temporary popularity, but failed to make an abiding impression. Broussais's theory was on the wane, as a partial view of truth, not containing a complete and unitary principle of science.

BROUSSON, Claude, a French Protestant martyr, born in Nîmes in 1647, put to death in Montpellier, Nov. 4, 1698. He was an advocate at Castres and Toulouse, and displayed great ability in defending the Huguenots. After the interdiction of the Protestant synods, 16 deputies of the principal Protestant communities of France assembled at his house in 1683; these meetings were subsequently called *les assemblées du désert*. The outbreak which resulted from these meetings compelled Brousson to leave Toulouse; and barely escaping arrest at Nîmes, he fled to the Cévennes, and thence to Switzerland. With many Protestant ministers of the Cévennes he was hanged in effigy, July 8, 1684, in the market place of Nîmes. Returning to the Cévennes, he was ordained under the name of Paul Beausole, and remained there as an itinerant preacher, amid great perils, till December, 1693, when he returned to Switzerland, after addressing to the governor of the province of Languedoc, who had put a price upon his head, a *lettre apologétique*, in reply to the charge of being a disturber of the public peace. In November, 1695, he ventured into France, by way of the Ardennes; but being recognized, he fled again to Switzerland, proceeding thence to the Netherlands, where the government gave him a pension. In 1697 he recrossed the frontier, entering France by the Jura mountains, and the next spring he was again preaching in the Cévennes. After narrow escapes he was arrested and sent to Montpellier, where he was broken on the wheel, upon the ground of alleged treasonable coöperation with the count de Schomberg in the scheme of invading France. His principal works are: *L'état des réformés de France* (3 vols., the Hague, 1684); *Lettres au clergé de France* (1685); *Lettres des Protestants de France à tous les autres Protestants de l'Europe* (Berlin, 1688); *Lettres au*

Catholiques romains (1689); *Relation sommaire des merveilles que Dieu fait en France dans les Cévennes*, &c. (1694). His biography was published at Utrecht in 1701.

BROUSSONNET, Pierre Auguste, a French physician and naturalist, born at Montpellier, Feb. 28, 1761, died there, July 27, 1807. He was the first who introduced the botanical system of Linnæus into France. He caused the first flock of merino sheep to be brought from Spain, and the first Angora goats from the Levant. In 1789 he became a member of the national assembly, and in 1792 of the convention; but, incurring the suspicions of the terrorists, he in 1793 escaped to Madrid. Here, having had no opportunity to secure any of his property, he was reduced to great poverty when Sir Joseph Banks, whose acquaintance he had made during a three years' residence in England, sent him a gift of \$5,000, and procured him a passage to India in an English ship. The vessel in which he had embarked was forced into Lisbon harbor by a storm, and finding that his old political associations exposed him even here to fresh persecutions, he passed over to Africa, where he procured employment as a physician at Morocco, and resumed his botanical and zoölogical studies. Under the empire he was appointed French consul at Mogadore and the Canaries; and in 1805, on his return to France, he was made a member of the legislative body. He belonged to the principal learned societies of France, and was the author of several botanical, zoölogical, and medical works of great value; the most important of them is his *Ichthyologia, seu Piscium Descriptiones et Icones* (London, 1782), which, however, he left unfinished, only one volume having been published.

BROWN, the name of counties in seven of the United States. **I.** A W. central county of Texas, intersected by Pecan bayou, and bounded S. by the Colorado river and W. by Jim Ned creek; area, 1,050 sq. m.; pop. in 1870, 544, of whom 37 were colored. The surface is undulating and hilly, with occasional tracts of rolling prairie, the soil of which is very rich. Stock-raising forms the chief occupation of the inhabitants. In 1870 there were 77 horses, 373 milch cows, 13,593 other cattle, 630 sheep, and 1,875 swine. Capital, Brownwood. **II.** A S. W. county of Ohio, separated from Kentucky by the Ohio river; area, 502 sq. m.; pop. in 1870, 30,802. The surface near the river is hilly, but in other portions level or gently undulating. The soil is fertile and well cultivated. The chief productions in 1870 were 199,605 bushels of wheat, 926,168 of Indian corn, 196,305 of oats, 13,587 tons of hay, 2,687,743 lbs. of tobacco, 62,756 of wool, 519,771 of butter, 51,684 gallons of sorghum molasses, and 10,776 of wine. There were 8,113 horses, 6,326 milch cows, 8,721 other cattle, 19,268 sheep, and 28,720 swine. Capital, Georgetown. **III.** A S. county of Indiana, watered by Bean Blossom and Salt

creaks; area, 320 sq. m.; pop. in 1870, 8,681. Its surface is diversified, and the soil is generally productive. Much of the land is well wooded. The chief productions in 1870 were 33,056 bushels of wheat, 197,784 of Indian corn, 61,139 of oats, 2,348 tons of hay, 24,498 lbs. of wool, and 65,765 of tobacco. There were 2,062 horses, 1,891 milch cows, 2,141 other cattle, 8,404 sheep, and 7,100 swine. Capital, Nashville. IV. A W. county of Illinois, bounded E. by the Illinois river; area, 320 sq. m.; pop. in 1870, 12,205. The surface is occupied partly by prairies and partly by woodlands. The soil is fertile and well cultivated. The Toledo, Wabash, and Western railroad passes through the county. The chief productions in 1870 were 130,778 bushels of wheat, 337,769 of Indian corn, 70,852 of oats, 3,533 tons of hay, and 26,439 lbs. of wool. There were 3,434 horses, 2,258 milch cows, 4,844 other cattle, 9,525 sheep, and 16,208 swine. Capital, Mount Sterling. V. An E. county of Wisconsin, at the head of Green bay, intersected by Fox or Neenah river; area, 323 sq. m.; pop. in 1870, 25,168. The surface is uneven and some of the soil fertile. The Wisconsin division of the Chicago and Northwestern railroad passes through it. The chief productions in 1870 were 164,227 bushels of wheat, 16,498 of rye, 13,152 of Indian corn, 153,953 of oats, 68,329 of potatoes, 19,525 tons of hay, and 309,838 lbs. of butter. There were 2,479 horses, 4,267 milch cows, 4,685 other cattle, 5,216 sheep, and 5,331 swine. Capital, Green Bay. VI. A S. county of Minnesota, bounded N. E. by the Minnesota river, and intersected by the Big Cottonwood and Little Cottonwood; area, 450 sq. m.; pop. in 1870, 6,396. There are several lakes in the S. part. The chief productions in 1870 were 218,370 bushels of wheat, 84,525 of Indian corn, 156,763 of oats, 24,448 of barley, 16,520 tons of hay, and 94,993 lbs. of butter. There were 1,202 horses, 2,155 milch cows, 3,631 other cattle, 995 sheep, and 1,796 swine. Capital, New Ulm. VII. A N. E. county of Kansas, bordering on Nebraska; area, 576 sq. m.; pop. in 1870, 6,823. It is drained by Grasshopper creek and other affluents of the Missouri. The St. Joseph and Denver City railroad crosses the county. The chief productions in 1870 were 62,619 bushels of wheat, 614,268 of Indian corn, 128,186 of oats, 57,961 of potatoes, 12,582 tons of hay, and 131,257 lbs. of butter. There were 3,004 horses, 2,767 milch cows, 5,141 other cattle, 2,590 sheep, and 7,900 swine. Capital, Hiawatha.

BROWN, Benjamin Gratz, an American journalist and statesman, born in Lexington, Ky., May 23, 1826. He is a member of a family of Virginian origin, the son of Mason Brown, and grandson of John Brown, United States senator from Kentucky. He graduated at the Transylvania university in 1845 and at Yale college in 1847, studied law at Louisville, and about 1850 took up his residence in St. Louis. He was a mem-

ber of the Missouri legislature from 1852 to 1858, and in 1857 delivered a speech which was regarded as initiating a movement in behalf of emancipation in that state. In 1854 he established the "Missouri Democrat," which subsequently led the Benton democracy through all phases of free-soilism, until it expanded into the republican party of Missouri. At the outbreak of the civil war he raised a regiment which assisted in the capture of Fort Jackson, and afterward commanded a brigade of militia. He promoted the act of emancipation of 1864. From 1863 to 1867 he was United States senator from Missouri, and in 1870 was elected governor of the state. In 1872 he was nominated for vice president of the United States, on the ticket headed by Horace Greeley, by the liberal republican convention at Cincinnati and the democratic convention at Baltimore.

BROWN, Charles Brockden, an American novelist, born in Philadelphia, Jan. 17, 1771, died Feb. 22, 1810. His ancestors were Quakers who came over with William Penn. At 11 years of age he was placed under the care of Mr. Robert Proud, author of a "History of Pennsylvania," and from him he derived a knowledge of the classics. He left Mr. Proud's school before he was 16, and soon afterward drew up the plan of several epics on the discovery of America and the conquest of Mexico and Peru. Neither of them was ever published, nor do any fragments of them remain. He determined to pursue law, but presently abandoned the profession for literature. The first of his novels was "Wieland," issued in 1798, and in 1799 he published "Ormond." These two novels were successful, and until Cooper produced his works there were no American fictions to compare with them. His third novel, "Arthur Mervyn, or Memoirs of the Year 1798," depicts the scenes in Philadelphia during the prevalence of the yellow fever. "Edgar Huntley, or the Adventures of a Sleep-walker," was published not long afterward. The scene of this story, as of "Wieland," is laid in Pennsylvania. In 1800 he published the second part of "Arthur Mervyn;" in 1801, "Clara Howard;" and in 1804, "Jane Talbot." From April, 1799, to the close of 1800, he conducted the "Monthly Magazine and American Review." In 1803 he commenced the "Literary Magazine and American Register," which he continued five years; and in 1806 he commenced a semi-annual "American Register," of which he published five volumes. A collection of his novels in 7 vols. was published in Boston in 1827. Another edition in 6 vols. appeared in Philadelphia in 1857.

BROWN, Ford Madox, an English painter, born at Calais, France, in 1821. He studied his art in Belgium and Paris, and sent two cartoons to the competition in Westminster hall in 1844, and a cartoon and fresco in 1845. After visiting Italy he painted "Wycliffe reading his Translation of the Scriptures," and in the following year exhibited "King Lear" and the "Young

Mother." He produced in 1851, at the royal academy, a large painting of "Chaucer reciting his Poetry at the Court of Edward III." "Christ washing Peter's Feet," exhibited in 1852, gained the prize of the Liverpool academy in 1856. One of his latest works is entitled "The English Fireside."

BROWN, Gould, an American grammarian, born in Providence, R. I., March 7, 1791, died at Lynn, Mass., March 31, 1857. He was a teacher for over 20 years in the city of New York. His "Institutes of English Grammar" appeared in 1823; in the same year he also published "First Lines of English Grammar." His "Grammar of English Grammars" (large 8vo, 1851) was the most extensive and complete grammar of the English language, and has continued to enjoy a high reputation. A revised edition, which he had just completed at the time of his death, appeared in 1857.

BROWN, Henry Kirke, an American sculptor, born at Leyden, Mass., in 1814. His first attempt at art was made at the age of 12, in the portrait of an old man. At 18 he went to Boston to study portrait painting, but soon turned his attention to sculpture. Having spent some time in Italy, he returned to America and fixed his residence in Brooklyn, N. Y., applied himself to the casting of bronze, and produced the first bronze statue ever cast in this country. He has completed several well known works in marble, "Hope," the "Pleiades," the "Four Seasons," and the statue of Gen. Nathanael Greene in the capitol at Washington. In bronze he has executed a statue of De Witt Clinton, the equestrian statue of Washington in Union square, New York, the statues of Lincoln in Brooklyn and New York, and an equestrian statue of Gen. Scott in Washington.

BROWN, Hugh Stowell, an English clergyman, born at Douglas, Isle of Man, in 1823. At the age of 15 he went to England to learn land surveying, and two years afterward went to Wolverton to learn engineering, and became an engine driver on a railroad. It was his habit, after his day's work was done, to spend several hours in study, and he wrote his first classical exercises with chalk upon the fire box of the engine. Becoming of age, he entered King's college in his native town, where he remained three years. Entertaining doubts as to some of the doctrines of the established church, he joined the Baptist denomination, and in 1848 was appointed minister of a chapel in Liverpool, and soon became the leader of the denomination in that city. He is a popular lecturer to the working classes, large numbers of whom attend his Sunday afternoon services. His published lectures have had a large sale.

BROWN, Jacob, an American general, born in Bucks co., Penn., May 9, 1775, died in Washington, Feb. 24, 1828. He was descended from members of the society of Friends; supported himself in early life by teaching school; was also employed for some time as a surveyor of public lands in Ohio; and settled in Jefferson

co., N. Y., then a wilderness, in 1799. He was a militia general in 1812; was soon after appointed brigadier general in the regular army, and in 1814 major general; assisted in the defence of Sackett's Harbor in 1813; and in the following year exhibited much bravery in the battles of Chippewa and Niagara Falls, and in the siege of Fort Erie, receiving the thanks of congress and a gold medal. At the termination of the war he continued in the army as major general, succeeding in 1821 to the chief command.

BROWN, John, an English author, born at Rothbury, Northumberland, Nov. 5, 1714, killed himself, Sept. 23, 1766. He was educated at Cambridge, and during the rebellion of 1745 acted with much gallantry as a volunteer on the royal side. He afterward became rector successively at Moreland, Great Horkeley, and Newcastle. He was preparing to go to Russia, on the invitation of Catherine II. to aid in establishing a system of education, when an attack of gout and rheumatism caused him to commit suicide. His works include "Essays on the Characteristics of the Earl of Shaftesbury," a tragedy called "Barbarossa," a "Estimate of the Manners and Principles of the Times," which passed through seven editions in one year, a "History of the Rise and Progress of Poetry," and "Thoughts on Civil Liberty, Licentiousness, and Faction."

BROWN, John, a Scottish Biblical critic, born in Perthshire about 1722, died at Haddington, June 19, 1787. While tending sheep on a farm he learned to read, and soon mastered the Latin, Greek, and Hebrew languages. At the age of 26 he opened a school, with the intention of becoming a minister of the Scottish church. He sided with the party who seceded from the church soon after, was ordained, and became pastor of a small Secession congregation in Haddington. Here he learned the Italian, Spanish, German, Dutch, French, Arabic, Persian, Syriac, and Ethiopic languages. His principal works are, a "Dictionary of the Bible," a "Self-Interpreting Bible," and a "History of the British Churches."

BROWN, John, a Scottish physician, founder of the Brunonian system, born in Berwickshire in 1735, died in London, Oct. 7, 1788. He was the son of a poor farmer, and was early apprenticed to a weaver; but having previously manifested much aptitude for study at the grammar school of Dunse, the schoolmaster offered to instruct him gratuitously. The schoolmaster and the parents of Brown belonged to a body of Presbyterian seceders, and young Brown was destined for the ministry. While pursuing his studies he was induced to attend a meeting of the synod of the established church at Dunse, and this gave such offence to his friends that he left the society and joined the established church. He then became private tutor in a gentleman's family, and acted as an assistant in the grammar school. In 1755 he went to Edinburgh, and after passing

the preliminary classes, entered him-
as a student of divinity in the university.
some time he supported himself by private
ning, and then resumed his labors as as-
-tant teacher at Dunse, where he remained
t a year. In 1759 he returned to Edin-
-h, renounced the study of theology, and
-menced that of medicine, supporting him-
-by giving private instruction in Latin to
-ical students. Dr. Cullen employed him as
-ivate tutor in his own family, and recom-
-ended him to others, but opposed his nomina-
-to a professorship, whereupon Brown be-
-to attack the doctor's medical views. Hav-
-quarrelled with the professors at Edinburgh,
-ook his degree of M. D. at St. Andrew's.
-780 he published his *Elementa Medicinæ*,
-h contains the doctrines he propounded in
-osition to the views of Dr. Cullen, and for
-eral years he continued to explain these
-rines in public lectures. The excitement
-duced by this work was very great in all
-medical schools of Europe; and in Edin-
-h two hostile camps were formed among
-students, under the names of "Cullenites"
-"Brownites." The contest sometimes
-d with so much violence as to lead to col-
-ms among the younger partisans. In 1786
-wn went to London, where he opened a
-ate school of medicine, and gave lectures in
-own house in Golden square. His family
-large, and his habits intemperate; his ex-
-ses were greater than his income, and being
-olved in debt, he was confined in the king's
-ch prison during several months, until re-
-ed by the assistance of some of his friends.
-doctrines had gained many converts in the
-ical schools abroad, and he was making
-arations to leave England for the continent,
-on he died of apoplexy.—The publication of
-first work was followed in 1781 by "An In-
-ry into the State of Medicine, on the Prin-
-ciples of the Inductive Philosophy." In 1787
-published "Observations on the Principles
-of the Old System of Physic." A complete
-ion of his works (3 vols. 8vo) was pub-
-ed in London by his son, William Cullen
-own, in 1804. The basis of Brown's medi-
-theory is the doctrine of "excitability." In
-view, the human organism, in common with
-t of animals, mainly differs from inorganic
-ies by the property of being excited under
-influence of external agents, or the functions
-internal organs, peculiar to organic life.
-physical external agents which excite the
-anism to act are heat, light, air, and alimen-
-substances; internally, the blood and the
-ors which are drawn from the blood.
-se functions of the organs which produce a
-lar effect, according to this theory, are
-cular contractions, the various secretions
-the body, the passions, and the energy of
-brain in the processes of thought. These
-what Brown terms the stimulating or ex-
-ing forces, which, collectively considered,
-duce life; and when this influence ceases,

death ensues. The state of health consists in
a proper equilibrium between the exciting
forces and the vital principle of excitability
within the organism; disease consists in the
rupture of this equilibrium. Two kinds of ex-
cess may disturb the equilibrium of health, and
hence all diseases may be classed under two
general heads: those produced by an excess of
the stimulating forces, and those resulting from
an insufficiency of stimulation. The one are
called "sthenic" (Gr. *σθένος*, strength), and the
other "asthenic," from the want of force. The
treatment consists in diminishing the excess of
stimulus in one case, and supplying that which
is deficient in the other. His doctrines became
very popular for a time all over Europe. Gir-
tanner spread them in Germany, and Rasori in
Italy. Broussais developed similar views in
another form, 30 years later, in France, at-
tributing the origin of all diseases to inflamma-
tory action in the organism, and substituting
the word "irritability" in lieu of "excitabil-
ity," but adopting Brown's division of all dis-
eases into two classes, "sthenic and asthenic."
The exaggerations of these two schools have
lost their influence on many minds, but the
words which mainly characterized their doc-
trines, as stimulants and contra-stimulants,
irritability and excitability, sthenic and asthenic,
are still common in the medical vocabulary.

BROWN, John, an American officer, born at
Sandisfield, Berkshire co., Mass., Oct. 19, 1744,
died Oct. 19, 1780. He graduated at Yale
college in 1771, and officiated as king's attor-
ney at Caughnawaga, N. Y. In 1775 he went
into Canada, disguised as a horse trader, to ex-
cite the people to unite with the other colonies
in the revolution. He was with Ethan Allen
at the capture of Ticonderoga, and on Sept.
24 following took Fort Chambly. He was also
at Quebec when Montgomery fell. In 1776 he
was promoted to the rank of lieutenant colonel,
and during the next year was conspicuous on
the shores of Lake George. He was killed by
the Indians while marching to rescue Schuyler
in the Mohawk valley campaign.

BROWN, John, a Scottish divine, born near
Whitburn, Linlithgowshire, July 12, 1784,
died Oct. 13, 1858. He was ordained pastor
of the Burgher congregation at Biggar in 1806.
In 1821 he removed to Edinburgh, and was
chosen professor of divinity in 1834. As a
preacher he was among the first of his time.
His principal works are: "The Law of Christ
respecting Civil Obedience, especially in the
Payment of Tribute;" "The Resurrection of
Life;" and "Expository Discourses on the
Epistles of Peter, on the Epistle to the Gala-
tians, and on the Epistle to the Romans."

BROWN, John, a Scottish author, son of the
preceding, born in Biggar, Lanarkshire, in
September, 1810. He was educated at the
high school and the university of Edinburgh,
where he received the degree of M. D. His
literary reputation rests on a series of papers
contributed to the "North British Review"

and other periodicals, many of which, on professional and other subjects, have been republished under the title of "*Horsæ Subsecivæ*" (2 vols.). Among the most popular of these are several relating to the character and habits of the dog, an animal held by him in peculiar esteem. That entitled "*Rab and his Friends*" has been frequently published in separate form, and is perhaps the best known and most popular of his writings.

BROWN, John, an American abolitionist, born in Torrington, Conn., May 9, 1800, hanged at Charlestown, Va., Dec. 2, 1859. He was fifth in descent from Peter Brown, who landed at Plymouth, Mass., from the *Mayflower* in 1620. At the age of five years he emigrated with his father to Hudson, Ohio, where his youth and early manhood were passed. When a boy he was often sent distances of 100 miles or more in charge of droves of cattle, and visiting several encampments of American troops during the war of 1812, he acquired so great a disgust for military life that he invariably refused to perform military duty, choosing rather to be fined than to serve as a soldier even in time of peace. He then resolved never to take part in any war which was not one for liberty. About this time, as appears from a fragment of an autobiography left by him, he conceived that detestation of slavery which became the master passion of his life. He received a strict religious education, and at 16 years of age was a communicant of the Congregational church and a diligent reader of the Bible. In 1819 he went to Plainfield, Mass., with a view of entering the orthodox Calvinistic ministry; but a chronic inflammation of the eyes compelled him to abandon his studies and return to Ohio, where he resumed the tanner's trade, which he had previously practised in his father's service. For the next 20 years he carried on this business partly in Ohio and partly in Crawford county, Penn.; but having lost the greater part of his property by unfortunate speculations in land, he returned to Ohio, and in 1840 embarked in the wool trade. In 1846 he removed with his family to Springfield, Mass., where he opened a wool warehouse. Many wool-growers of northern Ohio consigned their stock to him to be sold at discretion; but having attempted to establish a system of grading wools, he brought himself into collision with the manufacturers of New England, who combined to purchase wool directly from the producers. Brown thereupon took a large quantity of wool to Europe, which was sold in London at half its value, and he returned to America a ruined man. In 1849 he removed his family to North Elba, Essex county, N. Y., and began to reclaim a tract of wild land given to him by Gerrit Smith. For ten years previous to this time he had harbored the thought of becoming the liberator of the southern slaves; and as the region in which he settled was partially occupied by negro colonists, whom Mr. Smith's liberality had planted there on

free homesteads, he undertook to counsel and instruct them, hoping thereby to further indirectly the scheme which lay nearest to his heart. But the negroes, unaccustomed to the rigors of a northern climate, and disheartened by the toils and hardships involved in clearing their mountain farms, soon relinquished them. Brown and his family, which now included a number of grown-up sons and daughters, persevered, and ultimately established comfortable homes for themselves. In 1851 he returned to Ohio and again engaged in the wool business. In 1854 his four eldest sons, residing in Ohio, migrated to Kansas. They went unarmed, and settled in Lykins county, about 8 m. distant from the village of Ossawatimie, and near the Missouri border. Partaking strongly in the anti-slavery opinions of their father, they were harassed, plundered, and threatened by marauding bands of pro-slavery men from Missouri; and they finally wrote to their father to bring them a supply of arms and ammunition. To this summons he lent a ready ear. Having brooded for fifteen years over schemes for arresting and overthrowing the slave power, he conceived that the moment had now arrived when he ought to take the field actively in that behalf. Trained by a life of toil to endure hardships, tough and sinewy of body, strictly temperate in his habits, and a brave, resolute, and God-fearing man of the type of his Puritan ancestor, he was singularly fitted to become a leader in the rough encounters which marked the border warfare of Kansas in 1854-'6. Moving his family back to the farm in North Elba, he departed in 1854 for Kansas, with no intention of settling there, but prepared to lay down his life if necessary in the anti-slavery cause. In November of this year the people of Lawrence, the headquarters of the free-state men, armed themselves to repel an attack from a large body of Missourians, who, organized as Kansas militia, had laid siege to the town. While the hostile forces were watching each other, John Brown, accompanied by his four sons, all armed to the teeth, appeared among the besieged. He received a command and counselled an immediate movement upon the enemy; but the leaders of the free-state men, unwilling to bring on a collision, were endeavoring to adjust the difficulty by negotiation. This disgusted Brown, who, in reply to an invitation from Gen. J. H. Lane to attend a council of war, said: "Tell the general when he wants me to fight to say so; but that is the only order I will ever obey." Thenceforth his operations were of an irregular character and conducted exclusively by himself. In May, 1856, at the head of a small body of determined men, he went into camp on the Pottawattamie, near the residence of his sons. A few days later he was engaged in the combat of Black Jack, which resulted in the capture of a superior force of Missourians, with a considerable amount of plundered goods. Other affairs of the kind occurring during the

mer enhanced his reputation as a partisan warrior and hard fighter, and he was both hated and feared by the pro-slavery marauders. In the latter part of August a fresh invasion of Missourians poured into the territory, numbering nearly 2,000 men. A part of this force was driven back by Gen. Lane, while the other body of 500 marched upon the town of Ossawatimie, near which Brown was camped with about 30 men. Owing to the rapid advance of the assailants, a part of his force was cut off and one of his sons killed; but the remainder, about 15 men, he took post in the woods adjoining the town, where for nearly an hour he offered an obstinate and successful resistance. When by various casualties the little force had become diminished one half, he effected a retreat in safety, having inflicted severe loss in killed and wounded on the enemy. This encounter gave Brown a sort of national reputation, and the sobriquet of "Ossawatimie Brown" clung to him until his death. A few weeks later he was again in Lawrence, on his way home from Topeka, when the announcement was made that an overpowering force of Missourians was approaching to attack the town, which at the moment contained fewer than 200 able-bodied men. Brown was unanimously chosen leader, and having made a characteristic speech to his men, whom he urged to fight deliberately and aim at the enemy's head, he posted his force in and around the town. The enemy approached within half a mile, but hesitated to make an attack, and both sides lay on their arms during the night. When the sun rose the Missourians had decamped. In the afternoon Brown, accompanied by his two sons, left for the east to obtain arms and supplies for the free-state emigrants in Kansas. He remained away a year. In February, 1857, he addressed a committee of the Massachusetts Legislature, appointed to consider petitions in favor of a state appropriation to protect the rights of Massachusetts citizens in Kansas; and in Boston and other cities he had frequent interviews with anti-slavery sympathizers. The mission proved an unsuccessful one so far as substantial aid was concerned. His proposition to drill and equip a body of men for service in Kansas savored too much of aggressive warfare to meet the views of most of those to whom he addressed himself. None could doubt his honesty and devotion to the anti-slavery cause, but few were willing to trust a man whose enthusiasm for freedom evidently bordered on fanaticism. Many persons believed him to be insane on the subject. In November, 1857, he returned to Kansas and began to enter into practical operation a project in furtherance of the anti-slavery cause far in advance of any views previously made public by him. It was nothing less than to attack the institution of slavery in one of its oldest seats, and by the aid of liberated slaves to overthrow it throughout the Union. This project, conceived many years previous, was matured partly

during the border warfare in Kansas and partly while on his visit to the eastern states; but he unfolded it very cautiously, and would probably have hesitated to carry it out so soon had not his zeal been inflamed by the exciting scenes through which he had recently passed. He revealed it to few if any of those from whom he solicited aid in behalf of the free-state cause. With a small number of resolute men, carefully selected, he soon after repaired to Iowa, where they passed the winter of 1857-'8 in practising military exercises. He now informed his followers that they were to serve in Virginia instead of Kansas, as they had supposed, and that Harper's Ferry would be the scene of his first operations against the slaveholders. For the furtherance of his plans Brown relied very considerably upon the assistance of fugitive slaves who had escaped from the United States into Canada; and for the purpose of informing these people of his intentions and of inducing them to coöperate with him, he called a secret convention of the "friends of freedom" at Chatham, Canada West, in May, 1858. The result of its deliberations was the adoption of a "Provisional Constitution and Ordinances for the People of the United States," drafted by Brown, and which was essentially an embodiment of his political opinions. The preamble declared that the instrument was framed mainly in the interests of the slaves and other people "degraded by the laws of the United States," and many of the articles provided for the maintenance of order among insurgent slaves and for other contingencies which seemed likely to arise. One of them disclaimed any intention to overthrow the government of the United States or dissolve the Union, and limited the action of the framers to "amendment and repeal." Under this constitution Brown was chosen commander-in-chief; J. H. Kagi, secretary of war; Owen Brown, son of John Brown, treasurer; and Richard Realf, secretary of state, the three last named being members of Brown's party from Iowa. No person being permitted to hold more than one office at a time, the presidency was temporarily conferred upon Elder Monroe, a colored clergyman. Brown had hoped to proceed at once to Harper's Ferry, but several circumstances combined to prevent the immediate execution of his plan, the chief obstacle being the want of money. He therefore returned in June, 1858, with a portion of his party, to Kansas, and settled temporarily in the southern part of the territory, which was then the theatre of border warfare, as northern Kansas had been a year or two previous. On Dec. 19, while the excitement was at its height, a slave named Jim secretly crossed the border to Brown's cabin and announced that he and his family had been sold, and would be sent to Texas the next day. Brown, with 20 men divided into two parties, immediately crossed over into Missouri and liberated the slaves, whom, with 6 other negroes, making 11 in all, they

conveyed into Kansas. In this enterprise one of the owners of the slaves was killed. An unprecedented excitement followed. Not only was a large reward offered for Brown's arrest, but the more moderate free-state men hastened to disavow any sympathy with his daring act. The territory became too hot for him, and he started early in January, 1859, for the north, accompanied by four white companions and the liberated negroes. Pursued by a party of 30 men, subsequently increased to 42, he made a stand in a deserted log cabin, whence, having provided for the safety of the women and children under his charge, he issued forth with seven male companions to do battle with the enemy. The latter precipitately fled, with the exception of four men, who were at once made prisoners. Brown subsequently took the slaves into Iowa, whence in the middle of March he conveyed them safely to Canada. He now began in earnest his preparations for the invasion of Virginia. In the latter part of June he appeared in Hagerstown, Md., where he represented himself to be a farmer named Smith from western New York, in search of a cheap farm adapted to wool-growing. He finally hired for a few months an unoccupied farm in Virginia, about six miles from Harper's Ferry, which he occupied with several of his party early in July. Others joined him from time to time, including three of his sons, until the force numbered 22 persons, of whom 17 were white men and the remainder negroes. Boxes of arms, ammunition, and other supplies which had been shipped to Chambersburg, Md., the previous year, were gradually removed to the farm in Virginia, without exciting the suspicions of the neighbors. In selecting this place for the first attack Brown had for his immediate object the capture of the United States arsenal at Harper's Ferry, where were usually stored from 100,000 to 200,000 stand of arms. This building with its contents once in his possession, he expected to rally to his support the slave population of the neighborhood, and, when his force was sufficiently recruited and equipped, to convey them into the free states, or, if that should prove impossible, to retire to the mountains and inaugurate a general servile war. The night of Oct. 24 was originally fixed for the attack upon the arsenal, but at a council called by Brown on Sunday, the 16th, it was determined to begin operations that very evening. The presence of so large a party of men in the neighborhood with no ostensible object had begun to arouse the suspicion of the Virginians, and further delay was considered dangerous. About 10 o'clock on Sunday night Brown and his men entered the village of Harper's Ferry, and, having extinguished the lights on the streets, took possession of the arsenal, overpowering and making prisoners the three watchmen who formed the sole guard of the building. The watchman at the bridge across the Potomac was next captured, and the railroad train from the west, which

arrived there shortly after 1 A. M. on the 17th, was stopped. During the night the houses of Col. Washington and other citizens in the neighborhood were visited and stripped of whatever arms they contained, the owners were imprisoned in the arsenal, and their slaves were freed. At daylight on the 17th the train was allowed to proceed toward Baltimore, Brown freely informing every one who questioned him that his object in seizing the arsenal was to free the slaves, and that he acted "by the authority of God Almighty." As the morning advanced he gathered in prisoners, principally from among the male citizens who appeared upon the streets and the workmen who approached the arsenal to resume their daily avocations. By 8 o'clock the number exceeded 60. Heywood, a negro porter at the railroad depot, was ordered by Brown's followers to join them. He refused, and attempting to escape was shot dead. The citizens had by this time begun to recover from the stupor into which the audacity of Brown's attack had plunged them. A desultory firing was opened upon the arsenal, and several persons were killed and wounded upon either side, including the mayor and two other prominent citizens, and one of Brown's sons. But until noon Brown virtually held possession of the town. Up to that time his force had been increased only by the accession of six or eight negroes, who were compelled by threats to join him. As the day advanced, opposing forces gathered around him. Militia from the neighborhood marched into the town, and the captors of the arsenal soon found themselves closely besieged in the building. Of the two insurgents guarding the bridge, one was killed and one captured. Five men who occupied the rifle works were driven out, and all were either killed or captured. The arsenal was now commanded on all sides by the armed Virginians, who poured ceaseless volleys upon it, which were returned by the garrison. So greatly were the attacking forces incensed by the shooting of the mayor and other popular citizens that when Aaron D. Stevens, one of Brown's most trusted followers, was sent out with a flag of truce, he was instantly shot down, receiving six balls in his body; and Thompson, the prisoner captured at the bridge, was put to death. By nightfall of the 17th the arsenal was completely invested by the militia, and Brown retired, with such of his prisoners as had not escaped, to the engine house, an attack upon which he repulsed with a loss of two killed and six wounded to the assailants. Soon after this the firing ceased for the day. The situation was then desperate for Brown. His force had dwindled to three uninjured white men besides himself, and a few negroes from the neighborhood. The remainder were killed or mortally wounded, with the exception of half a dozen who had been sent out in the morning to liberate slaves and could not rejoin their chief. The latter nevertheless displayed

the night a coolness and self-control which extorted the admiration of his prisoners. With one son dead by his side," says Col. Whittington, "and another shot through, he held the pulse of his dying son with one hand, his rifle in the other, and commanded his men with the utmost composure, encouraging them to be firm and to sell their lives as dearly as possible." An offer to release his prisoners if his men were permitted to cross the river in safety having been rejected, the last hope of escape was closed to him. During the night Col. Robert E. Lee, with a body of United States marines and two pieces of artillery, arrived and took post near the engine house. At 7 o'clock on the morning of the 19th these troops battered in the door of the prison, and in an instant overpowered the entire garrison. Brown, fighting desperately, was at last struck down by a sabre stroke, and lay prostrate on the ground was twice shot. Although grievously wounded, he preserved his undaunted bearing. When questioned as to his object in seizing the arsenal and imprisoning citizens, he answered with perfect frankness, but refused to compromise persons still at liberty. Gov. Wise and Senator Mason of Virginia, and Mr. C. L. Valdemar, a member of congress from Ohio, examined him closely, but failed to elicit anything other than a simple statement of his motives and personal acts. He declined to answer any reasonable question, asserting that he had only done his duty in attempting to liberate the slaves of Virginia, and that he had nothing to regret save the failure of the enterprise. He however expressed great solicitude for his son Watson, who was captured in a similar condition, and who died on Wednesday, the 19th. On the same day Brown and his surviving comrades were conveyed to jail in Charlestown, Va. They were incarcerated a few days later for conspiring with others to produce insurrection, for treason against the commonwealth of Virginia, and for murder. On Oct. 27 Brown was brought to trial, his request for a brief delay on the ground that he was mentally and physically unable to proceed with his trial, and that he wished to confer with counsel of his own choice instead of those assigned to him by the court, having been denied. He was laid upon a cot within the bar, being too feeble to stand or even to sit, and in the presence of a court and jury, apparently prejudiced against him, conducted himself with singular calmness. He repelled with indignation the plea of insanity attempted to be urged in his behalf, and even offered, in order to save time and trouble, to identify his own handwriting which afforded strong evidence against him. Counsel meanwhile arrived from the north to defend him, but the trial went on. On the 31st he was found guilty on all the counts in the indictment, and on the succeeding day he was sentenced to be hanged on Dec. 2. In the speech

which he addressed to the court on this occasion he disavowed any intention of committing murder or treason or the wilful destruction of property. His prime object, he said, was to liberate the slaves, not to excite them to insurrection, and he therefore felt no consciousness of guilt. He laid considerable stress on his kind treatment of his prisoners in the arsenal, and also expressed himself satisfied with the treatment he had himself received on the trial. During his imprisonment he received visits from his wife and a number of northern friends, and held arguments on the slavery question with southern clergymen who attempted to offer him the consolations of religion. On the day appointed for his execution he left the jail, an eye-witness said, "with a radiant countenance and the step of a conqueror," pausing for a moment by the door to kiss a negro child held up to him by its mother. On the scaffold he was calm, gentle, and resigned, and warmly thanked all who had been kind to him during his imprisonment. Noticing that none but troops were present at the place of execution, he remarked that citizens should not have been denied the privilege of coming to see him die. He met his death with perfect composure, and was apparently the least concerned of all present over the tragic event of the day. His body was delivered to his widow at Harper's Ferry, by whom it was conveyed to the farm in North Elba to be interred. John Brown died as he had lived, a resolute, unyielding zealot. His piety was as sincere as it was severe. On one occasion in Kansas he compelled a party of profane Missourians captured by him to kneel and pray under penalty of being shot; and during the few weeks preceding the capture of the arsenal at Harper's Ferry he caused his followers to engage daily in prayer and the reading of the Scriptures. On every subject but slavery he was shrewd and eminently practical. As an exponent of the austere virtues of the men who founded the New England colonies, he seemed an offshoot from an earlier age; and it would be difficult to find his counterpart in that regard among men prominent in American history during the past half century.

BROWN, John Newton, D. D., an American clergyman and author, born in New London, Conn., June 29, 1803, died in Germantown, Penn., May 15, 1868. He studied at the literary and theological institution, now Madison university, Hamilton, N. Y., and entered upon his duties as a preacher in Buffalo, N. Y., where he remained one year. He then removed to Providence, R. I., to assist the Rev. Dr. Gano, pastor of the first Baptist church in that city, and afterward preached at Malden, Mass., and in Exeter, N. H. At Exeter he edited the "Encyclopædia of Religious Knowledge" (1 vol. small 4to, Brattleboro, 1835), which was republished in England. In 1838 he became professor of exegetical theology and ecclesiastical history in the New Hampton theological

institution, N. H. In 1845 his health compelled him to remove south, and he became pastor of a church in Lexington, Va., where he remained till 1849. He then removed to Pennsylvania, and was appointed editorial secretary of the American Baptist publication society. He was also editor of the "Christian Chronicle" and the "National Baptist." At the time of his death he was engaged upon a history of the Baptist denomination.

BROWN, Nicholas, the principal patron of Brown university, born in Providence, R. I., April 4, 1769, died Oct. 27, 1841. He was liberally educated at the Rhode Island college, at the age of 22 inherited an ample fortune, and founded the mercantile house of Brown and Ives, one of the most successful in the country. In 1796 he was chosen secretary of Rhode Island college, which office he retained till 1825, when he was elected to the board of fellows. When first made secretary he presented the college with \$5,000 and a good law library, in consequence of which the name of the college was changed to that of Brown university. In 1823 he built a second college edifice entirely at his own expense. His gifts to the university amounted in all to \$100,000. He also contributed largely to the Providence Athenæum, and aided in the building of churches and the endowment of colleges in every part of the country. He bequeathed \$30,000 for the establishment of an insane asylum at Providence.

BROWN, Robert, an English Puritan theologian, founder of the sect of Brownists, born about 1550, died about 1630. His family was nearly connected with Cecil, afterward Lord Burleigh. He studied at Corpus Christi college, Cambridge, where he first imbibed his Puritan beliefs from Thomas Cartwright, then professor of divinity. Cartwright's views were, however, only the germs of the opinions soon developed by Brown, who on leaving Cambridge at once began a vigorous opposition to the whole discipline and liturgy of the established church. Acting as a schoolmaster, lecturer, and preacher at Islington, he nevertheless devoted much of his time to excursions about the country, delivering polemical addresses. For the agitation thus created he was for a short time imprisoned by the bishop of Norwich in 1580 or 1581; but on acknowledging that he had employed wrong means in the propagation of his theories, he was released. He next became pastor of a Dutch society of Anabaptists at Norwich, and made many converts to his doctrines. The virulence of his attacks on the Anglican hierarchy caused him to be summoned before an ecclesiastical commission, who again placed him in custody, but Lord Burleigh procured his release. These and other imprisonments, censures, and persecutions caused many to look upon Brown as a martyr for conscience, and he gained a considerable following. But constant interference with his congregation now forced him to leave England, and he and his

followers went to Holland and Zealand, where they established themselves. Their principal congregation was at Middelburg in Zealand; others were at Amsterdam and Leyden. Here they speedily became involved in dissensions with the sects about them, and finally quarrelled among themselves. Brown returned to England in 1585, and after preaching for a time at Norwich as before, and subjecting himself first to admonition by the bishop, and then, by his persistency, to excommunication, he suddenly announced his recantation, and begged for readmission into the established church. This was accorded him in 1590, and he was soon made rector of a small church near Thrapston, Northamptonshire. During the remainder of his life he is said to have been idle and dissolute, seldom entering his church. He died in prison, whither he had been sent for resisting a constable who had demanded his taxes.—The views held by Brown and his followers were briefly these: Every religious congregation should constitute an independent, self-governing body, whose minister should be chosen by it. All members of such a congregation should be equal; and a layman might act as minister, or question the minister. There should be no fixed forms of prayer, but this should be extempore. Marriage should not be celebrated in the churches, but considered as a civil contract. The Brownists also desired change in many minor points. Brown's followers maintained these principles after his defection, and rapidly grew into the large and influential sect of Independents. Brown's principal writings are: "A Treatise of Reformation, without tarrying for any Man;" "A Treatise on the Trinity, third chapter of St. Matthew," &c.; and "A Book which sheweth the Life and Manners of all True Christians." These were published together at Middelburg in 1582.

BROWN, Robert, a British botanist, born at Montrose, Dec. 21, 1773, died in London, June 10, 1858. He studied medicine at Edinburgh, and was appointed botanist in the Australian expedition of Capt. Flinders, which sailed in July, 1801. Accompanied by the flower painter Frederick Bauer, he visited the coasts of Australia, Tasmania, and many of the islands of Bass's strait, returning to England in 1805 with a rich collection of plants, comprising more than 4,000 different species. He was then appointed conservator of the botanical collections of Sir Joseph Banks and librarian of the Linnæan society, and labored several years at the methodical arrangement of the numerous species of plants collected in New Holland. An outline of this labor was published in 1810, under the title of *Prodromus Floræ Novæ Hollandiæ*. In 1814 he published his "General Remarks on the Botany of Terra Australis," as an appendix to Flinders's narrative, and in 1830 a *Supplementum primum Floræ Novæ Hollandiæ*. He also described and classified the different species of plants collected, be-

en 1802 and 1815, by Horsfield in Java, those collected by Salt in Abyssinia, by Sney and Clapperton in the interior of Africa, and by Christian Smith at the mouth of Congo. He was appointed in 1827 keeper of the botanical department of the British Museum, and retained that position until his death. Brown was the first English botanist to make an extensive application of the natural system of Jussieu. Vegetable physiology is indebted to him for several important discoveries. He first spoke of the peculiar movement of the molecules of pollen in plants, which is known by his name; and was the first to demonstrate that these molecules, on quitting the anthers, penetrate through the style down to the ovule below. On the death of Bishop Hensley in 1849, he was elected president of the Linnean society. Humboldt styles him the greatest botanist of our age."

BROWN, Sir Samuel, an English engineer, born in London in 1776, died March 15, 1852. He entered the navy at the age of 18, was made commander in 1811, and retired as captain in 1822. He brought into use both chain cables and iron suspension bridges, making the chains of long bars of flat or round iron pinned together by short links and bolt pins.

BROWN, Samuel, a Scottish chemist and poet, born at Haddington, Feb. 23, 1817, died in Edinburgh, Sept. 20, 1856. In 1832 he entered the university of Edinburgh, devoting himself chiefly to chemical studies. He began his public career in 1840 by delivering a course of lectures on the philosophy of the sciences. He early became interested in the nature of atoms and the laws of atomic action, contending that chemical substances usually considered simple are transmutable into each other. In 1843, believing that he was prepared to prove the isomerism and transmutability of carbon and silicon, he became a candidate for the chair of chemistry in the university of Edinburgh; but upon finding his proof incomplete, he withdrew. Subsequently he occupied himself with constant experiments upon his favorite subject, and at his death believed that he was on the point of a complete demonstration. In 1849 he delivered in Edinburgh a series of lectures on the history of chemistry, and in 1850 appeared his "Tragedy of Galileo." Two volumes of his essays and lectures were published in 1858, entitled "Lectures on the Atomic Theory, and Essays Scientific and Literary."

BROWN, Tarleton, an American soldier, born in the Barnwell district, S. C., in 1754, died in 1846. He served throughout the revolutionary war, attained the rank of captain, and left interesting "Memoirs" of his experience, containing much original information concerning the events of the time in the two Carolinas (privately printed, New York, 1862).

BROWN, Thomas, commonly called "Tom," an English satirist, born in Shropshire in 1663, died in 1704. He was educated at Oxford, became for a short time master of the

free school at Kingston-upon-Thames, and was for the rest of his life a "Grub street writer," indolent and fond of low society. He wrote a great deal in prose and verse, chiefly satirical and personal pieces. The highest as well as the lowest characters were the objects of his satire, which is sharp, though coarse and indecent. His first pamphlet, "The Reason of Mr. Bayes changing his Religion," published in 1688, was a personal attack on Dryden, who had become a convert to the Roman Catholic faith a little before. He also wrote "Short Epistles out of Roman, Greek, and French Authors" (1682), and "The Salamanca Wedding" (1693). An edition of his works in three volumes appeared in 1707-'8.

BROWN, Thomas, a Scottish philosopher, born at Kirkcubrecht, near Dumfries, Jan. 9, 1778, died at Brompton, near London, April 20, 1820. He was educated with great care by his mother. In his 15th year he was presented by Dr. Currie, the biographer of Burns, with the recently published first volume of Dugald Stewart's work on the philosophy of the human mind, which he read with admiration, though he criticised it with acuteness; and the next winter, while attending Stewart's lectures, he made known to the philosopher an objection to one of his theories—a circumstance that led to a lifelong friendship between them. Brown studied and practised medicine, and divided his leisure between the pursuits of poetry and philosophy. He published in 1798 his "Observations on the Zoönomia of Dr. Darwin," which contains the germ of his theory of causation and of the principles by which he was guided in his later philosophical inquiries. He contributed several articles to the early numbers of the "Edinburgh Review," one of which was on the "Philosophy of Kant," a subject of which, however, he had little knowledge. In 1803 he published a collection of his poems in two volumes, many of which had been written while in college, and which exhibited rather a taste than a talent for poetry. A local controversy induced him to publish a defence of Hume's theory of the relation between cause and effect. This work was pronounced by Mackintosh the finest model of philosophical discussion since Berkeley and Hume. It was enlarged in subsequent editions, and published in 1818 under the title of "An Inquiry into the Relation of Cause and Effect." In 1808-'9 he lectured on moral philosophy in the university of Edinburgh during the temporary absence of Stewart, at whose request he was in 1810 appointed adjunct professor of moral philosophy. As a philosopher he was in general opposed to the theories of Reid and Stewart. During the later years of his life he published "The Paradise of Coquettes," and several other poems, but they added nothing to his reputation, which rests chiefly upon his "Lectures on the Philosophy of the Human Mind," first published after his death (4 vols. 8vo, Edinburgh, 1820), and several times republished.

BROWN, William Laurence, a Scottish theologian, born at Utrecht, Holland, where his father was pastor, Jan. 7, 1755, died May 11, 1830. His father returned to Scotland in 1757, and he was sent to the grammar school and university of St. Andrews, but afterward removed to the university of Utrecht, where he combined with the study of divinity that of civil law. In 1778 he became pastor of the English church in that city. Between 1783 and 1793 he took several prizes offered for public competition by different learned bodies in Holland, producing among others a disputation in Latin on the "Origin of Evil," and one on the "Natural Equality of Man," which was printed in Edinburgh in 1793. He was also made professor and then regent of the university of Utrecht. In 1795, upon the approach of the French armies, he fled to England, where he was warmly received, and was made principal of Marischal college, Aberdeen, Scotland. At the first competition for the Burnet prize, his essay on the "Existence of a Supreme Creator" obtained the first place (Aberdeen, 1816). He afterward wrote "A Comparative View of Christianity and of the other Forms of Religion which have existed and still exist in the World, particularly with regard to their Moral Tendency" (Edinburgh, 1826).

BROWN COAL, one of the three great families into which coals are divided by mineralogists, and which are again subdivided into many subordinate varieties. In England it is also called Bovey coal, from Bovey, near Exeter, where it is principally found. The German deposits of brown coal are mainly in Prussian Hesse, Thuringia, the valley of the Rhine, the Westerwald (a hill chain in northern Nassau), and in Saxony. The mineral is also found in Alsace. Vegetable matters are met with in various stages of their conversion into mineral coal. In the formations of the present period they are found in great collections of peat, which are sometimes seen in beds alternating with others of sand and of clay. In the tertiary strata these vegetable collections occur in beds interstratified with others of limestone and the various rocks of this period. In some instances the plants are little altered, so that the species are easily recognized by the structure of the leaves and fruit. The stems are flattened and cross each other in all directions. The woody fibre has become more or less impregnated with bitumen, so that it burns with the peculiar smoke and flame of that substance. This material is called lignite, and sometimes brown coal. Beds of it are worked for fuel in upper Hesse. Another variety of brown coal is more altered in structure, so that its vegetable character is more indistinct, the beds presenting stratified bodies of dark, nearly black substance, with an earthy fracture. The lignite is sometimes seen mixed in the same specimen. This variety of brown coal is worked in the vicinity of Cassel. These varieties make but a poor quality of fuel, often containing from 30

to 48 per cent. of water. A large proportion of this, however, may be expelled by drying, though even then 8 per cent. or more may be reabsorbed. The amount of ash varies in the different qualities from less than 1 to more than 50 per cent. Sulphates of lime, potash, and iron often occur as impurities, and nitrogen is sometimes met with to the extent of 15 per cent. In 21 different analyses of brown coal by different chemists, the proportion of carbon is found to vary from 50 to 70 per cent. Brown coal has been found on both sides of the Andes in South America, and in numerous deposits on the eastern and western slopes of the Rocky mountains.—Jet is a black variety of brown coal, compact in texture, and taking a good polish, whence its use in jewelry. The oil extracted from brown coal, *oleum ligni fossilis*, is used for medicinal purposes. (See COAL.)

BROWNE, Charles Farrar, an American humorist, born at Waterford, Me., April 26, 1834, died at Southampton, England, March 6, 1887. He became a printer, and worked at his trade in Maine, in Boston, and finally in Cincinnati, where he became reporter for a weekly newspaper. In 1858 he wrote for the paper a letter purporting to come from a travelling showman, signing it with the *nom de plume* of Artemus Ward, which he afterward made so well known. In 1860 he went to New York, and became editor of "Vanity Fair," a humorous publication; after the failure of which he turned his attention to lecturing, his first lecture being delivered Dec. 23, 1861. His lectures were humorous in form, and their effect was enhanced by his quaint manner of delivery. In 1862 he published his first book, "Artemus Ward: His Book," which was followed by three other volumes, in 1865, '66, '67. In 1866 he went to England, where he lectured with success, and became a contributor to "Punch." He died there of consumption.

BROWNE, Edward Harold, D. D., an English bishop, born in 1811. He was educated at Cambridge, where he became fellow and tutor in 1835; was incumbent of St. James's, Exeter, in 1841; vice principal and professor of Hebrew at St. David's college, Lampeter, from 1843 to 1849; vicar of Kenwyn and prebendary of Exeter in 1853; Norrisian professor of divinity at Cambridge in 1854; and canon residentiary of Exeter cathedral in 1857. In 1864 he was consecrated bishop of Ely. He is the author of "An Exposition of the Thirty-Nine Articles" (1850; 9th ed., 1871), republished and edited by Bishop Williams of Connecticut. He has also published volumes of sermons, and was one of the contributors to "Aids to Faith," Smith's "Dictionary of the Bible," "The Speaker's Commentary," &c.

BROWNE, Frances, an Irish poetess, born at Stranorlar, county Donegal, June 16, 1818. At the age of 18 months she lost her sight from smallpox, and as she grew up her brothers and sisters read to her such books as they could procure. From the age of 7 to 15 she was

constantly composing verses; but becoming acquainted with the poetry of Pope and Byron, she perceived her own inferiority and for some years abandoned verse-making. In 1841 she began to contribute to the "Athenæum," the editor of which became interested in her story, and introduced her to other periodicals. In 1844 she published a small volume, "The Star of Atteghel, and other Poems," which was well received, and procured for her a pension of £20 from Sir Robert Peel, then prime minister, to whom she dedicated her next volume, the "Legends of Ulster." In 1847 appeared her "Lyric and Miscellaneous Poems," and about the same time a prose story, "The Ericksons." In 1847 she removed to Edinburgh, accompanied by a sister, who acted as her amanuensis, and in 1852 took up her residence in London. She has been a frequent contributor to various periodicals. In 1861 she published "My Share of the World," partially an autobiography, and in 1864 a novel entitled "The Hidden Sin."

BROWNE, George, count, a Russian general, born in Ireland, June 15, 1698, died at Riga, Sept. 18, 1792. He gained much distinction in the Russian service, in which he was actively engaged from 1730 to 1762. He was successively taken prisoner by the Turks and the Prussians, and afterward appointed by Peter III. to command the army against Denmark, with the rank of field marshal. Browne, however, declined taking a part in this war, which he deemed unjust, and the czar at first deprived him of his dignities and ordered him to leave the country, but soon recalled him as governor of Livonia, which office he held under his successor, Catharine II., for 30 years. The title of count was conferred on him in 1779 by the emperor of Germany, Joseph II.

BROWNE, Henriette (the pseudonyme of Sophie de Bouteiller, Madame Desaulx), a French artist, born in Paris in 1829. She is the great-granddaughter of the Irish general Browne, who settled in France after the battle of Culloden (1746), and the daughter of the count de Bouteiller, a Breton nobleman of much musical and administrative talent, by his marriage with the widow of the Italian composer Benincori. In 1855 she married M. Jules Desaulx, a diplomatist. Her first picture, "Reading the Bible" (1853), has been followed by many other genre paintings, portraits, and etchings, which are popular in England as well as in France. Among her productions are "The Puritans," "Consolation," "The Woman of Eleusis," two interiors of harems, "A Court at Damascus," and "Nubian Dancers."

BROWNE, Isaac Hawkins, an English poet, born at Burton-on-Trent in 1706, died in 1760. Among a collection of poems which he published, a short one called "The Pipe of Tobacco" obtained great popularity. He entered parliament for a Shropshire borough in 1744, but he was too timid to speak in the house. His reputation mainly rests on his Latin poem,

De Animi Immortalitate, modelled on the style of Lucretius and Virgil (1754).

BROWNE, John Ross, an American traveller and author, born in Ireland in 1817. While he was a child his father emigrated to America and settled in Kentucky. Young Browne, having learned stenography, went to Washington in his 18th year, and for two or three years was employed as a reporter in the senate. He then resolved to travel, and embarked on board a whaling ship. Returning from this voyage, he published "Etchings of a Whaling Cruise, with Notes of a Residence on the Island of Zanzibar." He now became private secretary to Mr. R. J. Walker, then secretary of the treasury. In 1849 he went to California with a commission from the government, and was employed to report the debates and proceedings of the convention for framing a state constitution. Returning to Washington, he remained there till 1851, when he went to Europe as a newspaper correspondent. He travelled through Italy, and made a tour in Sicily, and thence through Palestine, of which he gave an account in his "Yusef" (1853). Returning, he again entered the service of government as inspector of custom houses on the northern frontier and the Pacific coast, and wrote many magazine articles, some of which have since been collected into a volume entitled "Adventures in the Apache Country." In 1861 he again went to Europe, partly for the education of his children. Leaving his family at Frankfort-on-the-Main, he made journeys in Algeria, Iceland, Poland, and Russia. Accounts of some of these excursions have been published in volumes entitled "The Land of Thor" and "An American Family in Germany." All of these works are illustrated by sketches, mainly of a humorous character, from drawings by the author. Returning to the United States, he was deputed by government to examine into and report upon the mineral resources of the region west of the Rocky mountains. His final report, "Resources of the Pacific Slope" (8vo, New York, 1869), presents an elaborate review of the mines, climate, topography, agriculture, commerce, and miscellaneous resources of that portion of the Union. In 1868 he was appointed minister to China, but was recalled in 1870. His residence is at Oakland, near San Francisco.

BROWNE, Mary Ann (Mrs. James Gray), an English poetess, born at Maidenhead Thicket, Berkshire, Sept. 24, 1812, died in Cork, Jan. 28, 1846. Her first volume, "Mont Blanc and other Poems," was published before she was 15. Her second volume, "Ada," appeared in 1828. "Repentance and other Poems" (chiefly of a religious character) followed in 1829. The "Coronal" and "Birthday Gift" were published in 1833 and 1834. "Ignatia," her longest and most finished work, was published in 1838. She wrote for the "Dublin University Magazine" a series of prose tales entitled "Recollections of a Portrait Painter," and a num-

ber of poems, afterward collected as "Sketches from the Antique" (1844). About the same time a volume of "Sacred Poems" appeared. In 1842 she was married to Mr. James Gray, a nephew of the Ettrick Shepherd.

BROWNE, Simon, an English theologian, born at Shepton-Mallet, Somersetshire, in 1680, died in 1732. He was pastor of dissenting congregations in Portsmouth and London. In 1723, after the sudden death of his wife and only son, he conceived that the Almighty had taken away from him his rational soul, resigned his pastoral office, withdrew to his native town, and refused all society. Yet it was during this retirement that he published his principal works, which were directed against the opinions of Woolston and Tindal, and which display learning and a vigorous understanding.

BROWNE, Sir Thomas, an English physician and author, born in London, Oct. 19, 1605, died at Norwich, Oct. 19, 1682. After studying at Oxford he took his degree at Leyden, returned to England, and in 1636 established himself at Norwich. His first work, *Religio Medici*, appeared in 1642. It was a sort of confession of faith, remarkable for its quaint and original fancy, was soon translated into Latin and several continental languages, and gave him a wide reputation. This was followed in 1646 by his "*Pseudodoxia Epidemica*, or Inquiry into Vulgar Errors," the learning displayed in which is such that it has been called a cyclopædia of contemporary knowledge. Subsequently appeared his "*Hydriotaphia*, Urn Burial, or Discourse on Sepulchral Urns." His style abounds in felicitous expressions, but in his eagerness for brevity he often becomes obscure, and no other writer has so freely formed English words from the Latin. His "Christian Morals," a posthumous work, appeared first in 1716, and afterward, with a life of the author by Dr. Johnson, in 1756. His collected works, first published in folio in 1686, were edited by Wilkin (4 vols. 8vo, 1836), and reprinted in Bohn's "Antiquarian Library" (3 vols.).

BROWNE, William, an English poet, born at Tavistock, Devonshire, in 1590, died about 1645. He was educated at Oxford, and was afterward tutor successively to the earls of Carnarvon and of Pembroke. His principal poetical works are entitled "Britannia's Pastorals" (1613-'16), and the Shepherd's Pipe" (1614). They contain some fine descriptive passages, and were admired by Selden and Ben Jonson.

BROWNE, William George, an English traveller, born in London in 1768, died in Persia in 1813. He was educated at Oxford, travelled in Egypt, and attempted to explore the interior of Africa, but was stopped in Darfoor, where he was detained as a captive for three years. He published "Travels in Africa, Egypt, and Syria, in the years 1792-'98" (London, 1799; 2d ed. enlarged, 1806). He afterward undertook a journey through Persia, but on the way from Tabriz to Teheran was murdered by banditti.

BROWNELL, Henry Howard, an American author, born in Providence, R. I., Feb. 6, 1820, died in East Hartford, Conn., Oct. 31, 1871. He graduated at Washington (Trinity) college, Hartford, in 1841, and subsequently studied law, and was admitted to the bar, but turned his attention more especially to teaching and to authorship. A volume of his "Poems" was published in New York in 1847. He afterward wrote "The People's Book of Ancient and Modern History" (Hartford, 1851), and "The Discoverers, Pioneers, and Settlers of North and South America" (Boston, 1855). In the latter part of 1863 he entered the navy, and served as an acting ensign on the staff of Admiral Farragut. During the war he published several spirited and popular poems, which were gathered in a volume entitled "Lyrics of a Day, or Newspaper Poetry, by a Volunteer in the U. S. Service" (New York, 1864). After the war he accompanied Admiral Farragut to Europe, and then resigned and returned to Hartford. In 1866 a volume of his "War Lyrics and other Poems" was published in Boston.

BROWNELL, Thomas Church, D. D., LL.D., an American clergyman, born at Westport, Mass., Oct. 19, 1779, died in Hartford, Conn., Jan. 18, 1865. He was the son of a farmer, and was educated at Bristol academy, Taunton, at Rhode Island college (now Brown university), and at Union college, where he graduated in 1804. The next year he became tutor in Union college, in 1807 professor of belles-lettres and moral philosophy, and in 1809 was chosen the first professor of chemistry and mineralogy. The following year was spent in travelling through Great Britain and Ireland, and in gathering materials and apparatus for the department under his charge. In 1813 he began to turn his attention to preparation for the ministry, and having become an Episcopalian was ordained by Bishop Hobart, in Trinity church, New York, April 11, 1816. In connection with his professional duties he gave himself to the work of a missionary in Selenectady and its vicinity. In the summer of 1818 he became an assistant minister in Trinity church, New York. He was consecrated bishop of Connecticut Oct. 27, 1819, and removed at once to his new field of labor. Washington (now Trinity) college, at Hartford, Conn., took its rise under his auspices in 1824; he was its first president, resigning in 1831. He became presiding bishop in 1852, upon the death of Bishop Chase of Illinois. He was author of "The Family Prayer Book," which contains a commentary, historical, explanatory, doctrinal, and practical, on the liturgy of the Episcopal church. In 1839-'40 he prepared the "Religion of the Heart and Life" (5 vols. 12mo), a compilation from the best writers on experimental and practical piety, with introductions, &c.

BROWNING, Elizabeth Barrett, an English poetess, born at Hope End, near Ledbury, Herefordshire, in 1806, died in Florence, Italy, June

29, 1861. She was educated with great care in a masculine range of studies, and with a masculine strictness of intellectual discipline. She began to write at a very early age for periodical publications. In 1826 she published a volume entitled "An Essay on Mind, with other Poems." No portion of this volume is included in her collected poems. In 1833 appeared "Prometheus Bound, and Miscellaneous Poems." Her version of the "Prometheus Bound" cannot be considered successful, and she subsequently pronounced it an "early failure," and replaced it by a new translation. Some of the smaller poems in this volume are marked by the characteristics of her most mature productions. In 1838 she published a volume entitled "The Seraphim, and other Poems," of which the principal is a lyrical drama, embodying the thoughts and emotions which may be supposed to be awakened in angelic natures by the spectacle of the crucifixion. This production, as well as her "Drama of Exile," a subsequent work, in which the theme is drawn from the fall of man, is a very bold but not very successful effort to soar into heights of speculation and invention. In some of the smaller poems contained in this last mentioned volume, such as "Isobel's Child," "My Doves," and "The Sleep," we have glimpses of all that her genius was destined to accomplish. About the time of the publication of this volume her health, which had always been delicate, was seriously impaired by the rupture of a blood vessel, and for a long time she was on the verge between life and death. Her existence for many years was that of a confirmed and seemingly hopeless invalid. She did not leave her room, and saw only the members of her family and a few intimate friends. The long hours of illness were soothed by composition and study. The poets and philosophers of Greece were the companions of her mind, and some of the inspired writers of the Old Testament were studied by her in their original language. Some of the fruits of these studies were made public in a series of articles on the Greek Christian poets, which appeared in the London "Athenæum." In 1844 the first collected edition of her poems appeared in two volumes. In this her earlier productions were revised, and many pieces appeared for the first time in print, including "Lady Geraldine's Courtship," one of the most beautiful of her poems. It contained a graceful compliment to Mr. Browning, to whom she had not previously been personally known. That poet called to express in person his acknowledgments, and the acquaintance thus made ripened into intimacy and finally into love. Her health improved, and she became the wife of Robert Browning in the autumn of 1846. The growth and progress of this new feeling, and its effects upon her heart and mind, are described with rare grace of expression, as well as exquisite depth and tenderness of feeling, in a series of poems called "Sonnets

from the Portuguese," which appeared for the first time in the second edition of her collected poems, published in 1850. After their marriage Mr. and Mrs. Browning resided for many years in Florence. In 1851 she published "Casa Guidi Windows," a poem on some of the social and political aspects of Italy, the title of which is taken from the name of the house in which she lived in Florence. In 1856 she published "Aurora Leigh," a narrative poem in nine books; a sort of versified novel, of which the subject, characters, and incidents are taken from English life and manners of the present day. Her last publication, "Poems before the Congress," appeared in 1860. Mrs. Browning's rank among English poets is very high, and among female poets she holds unquestionably the first place. She combined in an extraordinary degree the distinctive characteristics of the masculine understanding and the feminine heart. She considered carefully, and was capable of treating wisely, the deepest social problems which have engaged the attention of the most sagacious and practical minds, and yet no one has ever given truer and more fervid expression to the joys, the sorrows, the aspirations, and the visions of the purely womanly nature.

BROWNING, Robert, an English poet, born in Camberwell, a suburb of London, in 1812. He was educated at the London university. At the age of 20 he went to Italy, where he remained some years, in order to make himself familiar with all that was peculiarly Italian. The mediæval history of that country, so fruitful in records of fervid passion and startling crime, was studied in its abundant chronicles and local memoirs. He spent much time in the monasteries of Lombardy and Venice, exploring their dusty libraries, and in the silent air of monastic life, calling up a more distinct image of the past than could have been vouchsafed to him in any "bustle of resort." But he devoted himself with equal energy to the task of making himself acquainted with the life and characteristics of the people around him. He studied a class of Italian population of which most travellers have only occasional glimpses—the peasants in their rural homes, and the residents of those dreamy old towns in which life flows on with so quiet a current. No traveller ever brought away a larger intellectual harvest from Italy than Mr. Browning; and the effect of his Italian life is distinctly perceived by the readers of his poetry, alike in his choice of subjects and his treatment of them. In 1835 appeared his "Paracelsus," a dramatic poem in which the principal character was the celebrated empiric and alchemist of the 16th century. It did not attract general attention, and has not the elements which secure popularity; but among the discerning few it was welcomed as the work of a truly original mind, rich in performance, and more rich in promise. In 1837 his tragedy "Strafford" was presented on the stage in London; but in spite of the ad-

mirable acting of Macready, by whom the principal character was sustained, it met with very moderate success. In 1840 he published "Sordello," a poem, the subject of which was drawn from the supposed life of the Mantuan poet, who appears in the 6th canto of Dante's *Purgatorio*. The general public pronounced this work an unintelligible rhapsody, with no meaning at all, and Mr. Browning has judiciously omitted it in the collective edition of his poems. Between 1842 and 1846 there appeared from his pen several successive numbers of a collection of dramatic and lyric poems, to which he gave the title of "Bells and Pomegranates;" an affected designation, and which had the further disadvantage of giving no hint as to the nature of the contents. Among these was a tragedy of striking poetical power, called "A Blot on the Scutcheon," which was produced in Drury Lane theatre in 1843, but without marked success. Another play of his, "The Duchess of Cleves," was subsequently brought out at the Haymarket, Miss Cushman personating the heroine. In 1849 his collective poems were published in London and Boston, which introduced him to a larger circle of readers than he had before enjoyed. In 1850 he published "Christmas Eve and Easter Day," a poem, in which a picture is presented from the author's point of view of some of the religious and spiritual aspects of the age, and some of his own convictions are expressed. In 1855 appeared his "Men and Women," a collection of poems. His latest publications are "The Ring and the Book," "Balaustion's Adventure" (1871), "Prince Hohenstiel-Schwangan, Saviour of Society" (1871), "Fifine at the Fair" (1872), and "Red Cotton Nightcap Country" (1873).—In November, 1846, Mr. Browning was married to Elizabeth Barrett. Soon after her death he returned to England with their only child, a son, and now resides in or near London.

BROWNLOW, William Cannaway, an American clergyman, journalist, and politician, born in Wythe co., Va., Aug. 29, 1805. Left an orphan at an early age, he learned the trade of a carpenter. In 1826 he entered the Methodist ministry, and labored for ten years as an itinerant preacher. As early as 1828 he began to take part in politics in Tennessee, advocating the reelection of John Quincy Adams to the presidency; and while travelling a circuit in South Carolina in which John C. Calhoun lived, he publicly opposed nullification. About 1837 he became editor of the "Knoxville Whig," a political newspaper. In consequence of his trenchant mode of expression, he became known as "the fighting parson." In 1856 he published "The Iron Wheel Examined and its Spokes Extracted," being a reply to attacks made upon the Methodist church. In 1858 he held a public debate in Philadelphia with the Rev. A. Pryne of New York, which was published in a volume entitled "Ought American Slavery to be Perpetuated?" Mr. Brownlow taking the affirmative. When the movement

for secession took place, he advocated the preservation of the Union as the best safeguard for southern institutions. In December, 1861, he was arrested on charge of treason against the confederacy, and detained till March, 1862, when he was sent within the Union lines. After this he made a tour through the northern states, delivering speeches in the principal cities, and published a book entitled "Sketches of the Rise, Progress, and Decline of Secession." In 1864 he returned to Tennessee, of which he became governor in 1865; and in 1869 he was elected to the senate of the United States.

BROWN-SÉQUARD, Charles Edward, a French American physiologist, born in the island of Mauritius in 1818. His father, Edward Brown, was a native of Philadelphia, and at one time commanded an American merchant vessel. He was lost at sea, in an attempt which he had volunteered in an old and badly furnished vessel to procure provisions for Mauritius, at that time suffering under famine. His mother, from whom he derives the name Séquard, was a French woman. Young Brown-Séquard was carefully educated in his native island. In 1838 he went to Paris to complete his studies, and received there the degree of M. D. in 1840. Since that time he has devoted his attention mainly to experimental physiology. He had a prize awarded him five times by the French academy of sciences, and he has twice received a part of the queen's grant for the encouragement of science from the royal society of London. He visited the United States several times, and delivered courses of lectures before various scientific bodies, illustrating his doctrines by the most delicate vivisections. His experiments on the blood give great support to the doctrine that the fibrine of that fluid is an excrementitious product, and not subservient to nutrition. He has produced all the life-giving effects of the natural blood by the transfusion of defibrinated blood. By the injection of oxygenated and defibrinated blood the irritability of the muscles was restored some time after the occurrence of post-mortem rigidity, and the blood returned by the veins venous in color and containing fibrine. Defibrinated and oxygenated, it was again injected by the artery, and thus the same blood was used for hours maintaining the irritability of the muscles. Arterial blood, according to him, is subservient to nutrition, and maintains the irritability of the muscles; venous blood is necessary to produce muscular contraction. By his experiments on animal heat the temperature in man is placed at 103° F., several degrees higher than by previous observers. When animals are asphyxiated their temperature at the time exerts a great influence on the duration of life. Previous observers had noted that certain poisons cause a rapid diminution of the animal temperature; according to Brown-Séquard when the animal heat is maintained by artificial means, the toxic action is much diminished. The great discovery of Sir Charles Bell of the

respective sensitive and motor functions of the anterior and posterior roots of the spinal cord, directed the attention of physiologists to that subject. After numerous and apparently contradictory experiments, the conclusion was generally acquiesced in that the posterior columns of the cord are sensitive, and convey sensations to the brain; that the anterior are motor, and convey the influence of the will to the voluntary muscles; and that the gray matter of the cord serves merely to reflect impressions from the sensitive to the motor nerve roots. As the result of numerous ingenious experiments, Brown-Séguard concludes that the sensitive fibres do not communicate directly with the brain, but convey impressions to the gray matter of the cord, by which they are transmitted onward to the brain, and that their decussation or crossing takes place in the cord itself, at or near the point at which they enter, not in the cerebrum or medulla oblongata. On the other hand, the anterior or motor fibres pass on directly to the brain, effecting their decussation in the medulla oblongata; the gray matter receives the impressions, conducts them to the brain, or reflects them upon the motor nerves, but is itself insensible to ordinary stimuli. These views enable us to understand some rare and curious facts in pathology which otherwise would remain inexplicable. Other researches of Brown-Séguard relate to the muscles, to the sympathetic system of nerves, to the effect of the removal or destruction of the supra-renal capsules in animals, &c. In May, 1858, he delivered a course of lectures on the nervous system before the royal college of surgeons at London, which attracted much attention. In 1864, having taken up his residence in the United States, he was appointed professor of the physiology and pathology of the nervous system in the medical department of Harvard university, a position which he held till 1868. In 1869, becoming again a resident of France, he was appointed professor of experimental and comparative pathology in the school of medicine at Paris. In 1858 he founded the *Journal de la physiologie de l'homme et des animaux*, which he made from the beginning a leading journal of physiology, and which he continued to conduct as editor till 1863. On his return to France in 1869 he established the *Archives de la physiologie normale et pathologique*, a journal of similar standing with the preceding. He has been a frequent contributor of scientific articles to the journals under his charge, and has also been much engaged as consulting physician for diseases of the nervous system. In 1873 he established himself as a practitioner in New York, and in conjunction with Dr. E. C. Seguin began the publication of a medical journal entitled "Archives of Scientific and Practical Medicine."

BROWNSON, Orestes Augustus, LL. D., an American author, born at Stockbridge, Vt., Sept. 16, 1803. In his 19th year he joined the Presbyterian church at Ballston, N. Y., where he

was at the time attending an academy; but he afterward changed his views, and became in 1825 a Universalist minister. He preached in different villages of Vermont and New York, and wrote for various religious periodicals in support of his new belief. His ecclesiastical position had grown into disfavor with him, when, making the acquaintance of Robert Owen, he was fascinated by schemes of social reform, and in 1828 he was prominent in the formation of the working men's party in New York, the design of which was to relieve the poorer classes by political organization; but he presently despaired of the effectiveness of this movement. Afterward the writings of Dr. Channing drew his attention to the Unitarians, and in 1832 he became pastor of a congregation of that denomination. In 1836 he organized in Boston the "Society for Christian Union and Progress," of which he retained the pastorate till he ceased preaching in 1843. Immediately after removing to Boston he published his "New Views of Christianity, Society, and the Church," remarkable for its protest against Protestantism. In 1838 he established the "Boston Quarterly Review," of which he was proprietor, and almost sole writer, during the five years of its separate existence, and to which he contributed largely during the first year after it was merged in the "Democratic Review" of New York. It was designed not to support any definite doctrine, but to awaken thought on great subjects, with reference to speedy and radical changes. To this end also he published in 1840 "Charles Elwood, or the Infidel Converted," a philosophico-religious treatise, in the form of a novel. In 1844 he entered the Roman Catholic communion, to which he has since remained attached. The method which he adopts in his philosophical system is the distinction between intuition (direct perception) and reflection (indirect or reflex knowledge). The mind is unconsciously intuitive; it does not, in intuition, know that it has intuition of this or that truth, because as soon as it knows or is conscious of the intuition it has reflex knowledge. Reflection can contain nothing which is not first in intuition. In order to reflect on that which we know intuitively, we must have some sensible sign by which the mind may apprehend or take hold of it. Such a sign is language, both in the ordinary and figurative sense of the word, which thus holds in the metaphysics of Mr. Brownson a place corresponding to that which tradition holds in his religious system. The knowledge of God, he maintains, is intuitive. The ideal element of every intellectual act is God creating creatures, *ens creat existencias*. The later publications of Mr. Brownson are "The Spirit Rapper" (1854), "The Convert, or Leaves from my Experience" (1857), and "The American Republic" (1865). From 1844 he supported almost single-handed, in Boston and New York, "Brownson's Quarterly Review," devoted especially to the defence of Roman Cath-

olic doctrines, but also discussing politics and literature. This periodical was suspended in 1864 and revived in 1873. He was invited by Dr. John H. Newman and others to accept a chair in the new university in Dublin, but he preferred to continue his labors in his native country. Translations of several of his works and essays have been published in Europe.

BROWN SPAR, a name given to dolomite, the magnesian carbonate of lime, when this is of a brown or reddish-brown color, from a small percentage of oxide of iron or oxide of manganese. Crystals of spathic iron and the mineral magnesite are sometimes called by the same name.

BROWNSVILLE. I. A post borough of Fayette co., Penn., on the Monongahela river, where it is crossed by the national road, about 80 m. S. of Pittsburgh; pop. in 1870, 1,749. A bridge over the river has been erected here at a cost of \$50,000, and another bridge, of cast iron, over Dunlap's creek, connects Browns-ville with the neighboring borough of Bridgeport. In the vicinity are rich mines of bituminous coal. The Monongahela is navigable to this point for large steamboats. **II.** A city, capital of Cameron co., Texas, on the left bank of the Rio Grande, opposite Matamoros, about 85 m. from the gulf of Mexico, and 310 m. S. of Austin; pop. in 1870, 4,905. It is easily accessible by steamboats, and contains a custom house and several churches. At the commencement of the war with Mexico, in 1846, the United States troops under Gen. Taylor occupied this place, threw up a strong work, and, leaving in it a small garrison, marched to the relief of Point Isabel, on the coast, where their supplies were threatened. In the mean time the Mexicans, under cover of the guns of Matamoros, erected batteries, and on May 4 commenced a bombardment of the fort, which lasted 160 hours. The Americans defended themselves with spirit, maintaining their position until the surrender of the city to Taylor, but losing their commander, Major Brown, who was killed by a shell on the 6th. It is in honor of this officer that the town was named. There is now a fort (Fort Brown) with a garrison of United States troops at this point. **III.** A village, capital of Haywood co., Tenn., on the Memphis and Louisville railroad, 57 m. N. E. of Memphis; pop. in 1870, 2,454, of whom 1,016 were colored. It is situated in the midst of a rich, level country, is surrounded by cotton and maize plantations, and is the centre of an active trade. It contains a female college under the direction of the Baptists.

BROWN UNIVERSITY (formerly Rhode Island College), a seat of learning in Providence, R. I., founded about the middle of the last century by the Philadelphia association of Baptist churches, at the special instigation of the Rev. Morgan Edwards, a Welsh clergyman of Philadelphia. The Rev. James Manning, a native of New Jersey, and graduate of Princeton, was authorized in 1768 to broach the scheme to

certain prominent Baptists of Newport, who whose aid the necessary money was raised, and a charter obtained in February, 1764, "for a college or university in the English colony of Rhode Island and Providence Plantations in New England, in America." One of the provisions of this charter is as follows: "And furthermore, it is hereby enacted and declared that into this liberal and catholic institution shall never be admitted any religious tests, but, on the contrary, all the members hereof shall for ever enjoy full, free, absolute, and uninterrupted liberty of conscience; and that the public teaching shall, in general, respect the sciences, and that the sectarian differences of opinions shall not make any part of the public and classical instruction." The government of the college is vested in a board of fellows, consisting of 12 members, of whom 8, including the president, must be Baptists; and a board of trustees, consisting of 36 members, of whom 22 must be Baptists, 5 Friends or Quakers, 5 Congregationalists, and 5 Episcopalians; the proportion representing the different denominations then existing in the colony. The instruction and immediate government of the college rest in the president and board of fellows. In the spring of the year in which the college was established, instruction was commenced by Warren, under the direction of Mr. James Manning, who was formally elected its president in September, 1765. A local contest for the seat of the college was finally terminated in favor of Providence in 1770. During a part of the war of the revolution instruction was suspended, and the college building was occupied by the state militia and by the troops of Rochambeau. Instruction was resumed in 1783. Mr. Manning was elected to continue in 1786, but soon resigned the post in consequence of its incompatibility with his duties at the college, and died in 1791, aged 53. Mr. Manning was succeeded by the Rev. Jonathan Maxcy, who resigned in 1802, and was succeeded by the Rev. Asa Messer, who was president in 1826. In 1804, during his presidency, the college received the name of Brown university, in honor of Nicholas Brown, its most distinguished benefactor. Mr. Messer was succeeded in 1827 by the Rev. Francis Wayland, D. D., who resigned in 1855, having by his personal character and writings greatly extended the reputation and influence of the university. The Rev. Barnas Sears, D. D., LL. D., was then chosen president, and resigned in 1867. He was succeeded by the Rev. Alexis Caswell, D. D., LL. D., and the latter, in January, 1872, the Rev. E. G. Robinson, D. D., LL. D.—11 officers of instruction are the president, nine professors, and three instructors, besides a librarian and register. The university has five college buildings, and a mansion house for the president. Its enclosures are graded and adorned with elms, and comprise upward of 16 acres situated on high land in the eastern section of the city. The college year is divided into two

terms with two vacations, one of three weeks beginning about the last of January, and another of nine weeks commencing the last week of June. Besides these there are two recesses of a week each. The annual commencement exercises occur on the last Wednesday in June, during which week candidates for admission to the college are examined. The course of study comprises four years. All the studies of the first two years and the first term of the third are compulsory. For the second term of the junior and senior years, geology, political economy, Latin, and Greek are elective; while Latin, Greek, and German are elective studies of the first term of the senior year. In addition to the regular collegiate course, there are courses of study covering three years for the degree of bachelor of philosophy. The annual college expenses are: tuition, \$75; room rent, \$20; use of library, \$3; register's salary, \$4; total, \$102. In the case of indigent students, \$25 per annum on the tuition may be remitted to a number not exceeding two fifths of all the students in college. Scholarships, 57 in number, each yielding about \$60 per annum, have been established; and a fund of \$50,000 has been placed by the state of Rhode Island in the custody of the corporation, the income of which sustains 80 scholarships. The state scholarships are open only to citizens of Rhode Island; and appointments to them are made on the nomination of the general assembly of the state. This fund was realized by the state from the sale of land scrip given by congress for the founding of a college of agriculture, which has been organized in connection with the university. A fund of \$8,000 has been given to the university by two of its friends, the income of which is applied either in the form of a gift or a loan to students. The following departments of practical science have been established in the university: 1, chemistry applied to the arts, in which particular attention is given to metallurgy, pharmacy, medical chemistry, and the application of chemistry to manufacturing processes; and 2, civil engineering, in which the course is three years. The course is not confined to undergraduates in either department. The course in the agricultural and scientific department is three years. The college library contains more than 40,000 volumes, and is constantly increasing from the income of a permanent fund of \$27,000. The museum of natural history contains a valuable collection of specimens. There is also a valuable collection of portraits. The invested funds of the university amount to \$602,653, the greater part having been contributed by private individuals, among whom are John Carter Brown, Nicholas Brown, Alexander Duncan, Rowland G. Hazard, William Sprague, William S. Slater, Earl P. Mason, William H. Reynolds, and H. N. Slater, all residents of Providence; of whom the five last mentioned subscribed in October, 1865, \$20,000 each. The sum of \$50,000 was bequeathed by

the late William Sanford Rogers of Boston, to found "the Newport-Rogers Professorship of Chemistry." According to the last triennial catalogue, issued in 1869, the whole number of alumni was 2,376, of whom 1,851 survived.

BRUCE, a N. W. county of Ontario, Canada, bounded W. by Lake Huron and N. and N. E. by Georgian bay, having a coast line of about 180 m.; area, about 1,600 sq. m.; pop. in 1871, 68,515. The chief river is the Saugeen, flowing N. W. into Lake Huron. The northern part is a rocky peninsula nearly cut off from the rest by Colpoy's bay on the west. The southern portion has a level surface and a good soil. Immense salt beds underlie part of the W. coast, and salt is exported to the United States. Capital, Walkerton.

BRUCE, a noble family of Scotland, three members of which obtained royal dignity. It was descended from Robert de Bruis, a Norman knight, who came to England with William the Conqueror, and whose grandson Robert received the lordship of Annandale from David I. of Scotland. **I. Robert**, fifth lord of Annandale, born in 1210, died at Lochmaben castle in 1295. He was one of the 15 regents of Scotland during the minority of Alexander III. When in 1291, by the death of Margaret, the "maiden of Norway," the succession reverted to the posterity of David, earl of Huntingdon, and youngest brother of King William the Lion, Bruce disputed the succession with John Balliol, the great-grandson of David by his eldest daughter, Margaret, he being the grandson of David by his second daughter, Isobel. The contest was referred to Edward I. of England, who decided "that in all indivisible heritages the more remote in degree of the first line of descent is preferable to the nearest in degree of the second," and thus gave the kingdom to Balliol, from whom he required homage and fealty. Bruce, in order to avoid swearing fealty to Balliol, resigned the lordship of Annandale to his son. **II. Robert**, son of the preceding, lord of Annandale and earl of Carrick, died in 1304. In 1270 he accompanied Edward I. of England to Palestine, and on his return to Scotland married the countess of Carrick, in whose right he became in 1292 earl of Carrick. Following the example of his father, in order to avoid doing homage to Balliol, he resigned the lordship of Annandale to his eldest son Robert, then a minor. Retiring to England, he was in 1295 appointed constable of the castle of Carlisle, and in the following year, when Balliol broke his allegiance to Edward, and, aided by Comyn, took up arms, Bruce fought on the side of the English. After the battle of Dunbar, April 27, 1296, when the Scotch were defeated, and Balliol renounced the sovereignty, Bruce, who was a favorite of Edward, applied to him for the crown of Scotland, but was refused. **III. Robert**, son of the preceding, earl of Carrick, afterward king of Scotland, born March 21, 1274, died June 7, 1329. He acted at first as

Edward's liegeman, but vacillated between the two parties, taking no very active part in the struggle between Wallace and England. He was associated in 1299 with John Comyn, nephew of Balliol and a pretender to the crown, and with the bishop of St. Andrews, as guardians of Scotland. With these he laid a plan for recovering the crown, though apparently still faithful to Edward. This plan was revealed by Comyn, and Bruce, meeting him by appointment at the church of the Minorite friars in Dumfries in 1306, stabbed him in a fit of rage. He then assumed the title of king, summoned the Scots to his standard, and was crowned at Scone in March. Edward made Aymer de Valence, earl of Pembroke, guardian of Scotland, and sent him to chastise the rebels. The force of Bruce was almost immediately destroyed in the wood of Methven; six of his best knights were made prisoners, and he himself was rescued only by the devotion of Seaton. For two months, with his brothers and the ladies of his household, he wandered to and fro in the wilds of the Grampian hills, until his party being discovered and forced to separate, he crossed over to the island of Rathlin, on the north of Ireland. His three brothers, wife, and sister were captured; the brothers were soon after hanged at Carlisle, and the ladies were imprisoned in various parts of England. His estates were confiscated, and he and his adherents were excommunicated by the papal legate. In the spring of 1307 Bruce returned, surprised his own castle of Carrick, defeated small parties of English in many skirmishes, and maintained himself among the hills and forests until Edward marched toward the border. The latter died on his way, leaving to his son a charge not to bury his bones till he had borne them in triumph from Berwick bounds to the utmost highlands. For three years Edward II. paid no attention to the Scottish war, and Bruce in the mean time established his power over nearly all Scotland, and in the spring of 1310 was acknowledged king. In September of the same year Edward marched into Scotland as far as the Forth without encountering an enemy. In the next year he sent Gaveston to renew the war, who penetrated beyond the Forth, but still gained no material advantages. The following years were passed by Edward in contentions with his parliament, and by Bruce in gradually recovering all that he had lost in Scotland, until in 1314 the fortress of Stirling alone held out for the English, and even that the governor, Mowbray, had agreed to surrender if it was not relieved before the feast of St. John the Baptist. This at length aroused Edward, who at the head of a large army encamped in the neighborhood of the beleaguered fortress, and was there met by Bruce with 30,000 picked men, on the eve of the festival fixed for its surrender. The battle of Bannockburn followed, June 24, 1314, and resulted in the utter defeat of the English. Bruce now exchanged his prisoners

against his wife, his sister, and his other relatives, who had been so long in captivity. After this success the Scotch assumed offensive and invaded Ireland, of which ward Bruce, brother of Robert, was crowning in 1316. While the dissensions between Edward and his barons, Robert repeatedly devastated the borders and north of Yorkshire. In 1323 a truce was concluded between the kingdoms for three years. Four years after this Edward II. compelled to abdicate in favor of his son, ward III., and Bruce renewed the war, the avowed intention of forcing Edward to renounce his claim of sovereignty over crown of Scotland. This renunciation made by a treaty ratified at Northampton in 1328, by which Scotland was declared a reign and independent. Bruce's title to throne was recognized, and Jane of England, the sister of Edward, married to David, prince of Scotland. After his death Bruce's body was embalmed in accordance with his desire that it should be carried to Palestine and buried in Jerusalem; but James Douglas, who undertook to execute this commission, was killed by the Moors in Spain, and the relic was returned and buried in Melrose abbey. The rest of the body was buried in the abbey church of Dunfermline, where the bones were found in 1843 when the new church was built. In 1329 a statue of Bruce was erected in Stirling. Bruce married first Isabella, daughter of Edward I., 10th earl of Mar, and had by her a daughter, Marjory, the mother of Robert II.; and second, Elizabeth, daughter of Aymer de Burgh, earl of Ulster, who became the mother of Edward II., his immediate successor. IV. Robert II., son of the preceding, king of Scotland, died in 1329, about 1324, died in Edinburgh castle, Feb. 1370. He was crowned at Scone Nov. 1331, and in the next year was dispossessed by Edward Balliol, son of John Balliol, and fled to take refuge in France, where he resided until 1341, when, Murray, Douglas, and Stuart expelled Balliol from Scotland, he went to return. In 1346, while Edward III. was sent in France, David suddenly invaded Scotland, but was totally defeated by a small army at Neville's Cross in Durham, and taken prisoner. From this time till 1357 David was detained in the tower of London, whence he was liberated after the battle of Poitiers, on agreement to pay 100,000 marks in 20 yearly instalments, a truce being sworn to between the two countries. This truce was afterward extended 25 years further, under the name of the truce, which was faithfully observed by David's nephew and successor, Robert, the first of the Stuart kings of Scotland. David's daughter Jane died in 1362, and he married Margaret Logie, from whom he was divorced in 1369. V. Edward, brother of King Robert Bruce, king of Ireland, was actively engaged in the struggle for the independence of Scotland.

08 he defeated the English, and made himself master of Galloway. In 1315 the chiefs of Ulster offered him the crown of Ireland, on condition that he would aid them in repelling the English. He embarked at Ayr with a force of 6,000 men, soon had possession of the whole province of Ulster, and was crowned king May 2, 1316, but was killed at the battle of Dundalk, Oct. 5, 1318.

BRUCE, James, a Scottish traveller, born at Innaird, Dec. 14, 1780, died there, April, 27, 1844. He was educated at London, Harrow, and Edinburgh, and intended for the profession of law; but finding the study distasteful, he went to London, where he married the daughter of a wine merchant's widow, and became a partner in the business. In 1757 he made a tour of southern Europe, partly on business and partly for diversion, returning on the death of his father in the following year to take possession of his estate in Scotland. In 1762 he was appointed consul general at Algiers. He had already spent some time in studying the Arabic and other oriental languages, and took great interest in African explorations; and when he reached Algiers in 1763 he made searches into its history and antiquities, besides acquiring some knowledge of surgery and medicine. Superseded in 1765, he travelled through Tunis and Tripoli, examining their historical remains, and finally embarked for Syria. He visited Palmyra and Baalbec, resided for some time in Aleppo, went to Alexandria, and after some researches into the antiquities of Egypt set out to explore the head waters of the Nile. He spent about two years in Abyssinia, and traced the Abai, then supposed to be the main stream of the Nile, to its source. He reached England, after many hardships, in 1774. His "Travels to discover the Sources of the Nile, in the Years 1768-73," did not appear till 1790 (5 vols. 4to). The work contained many statements which were considered authentic at the time of its appearance, but the truth of which has been confirmed by later travellers. A second edition, accompanied by biography and copious notes, was prepared in 1805 by Dr. Alexander Murray.

BRUCE, Michael, a Scottish poet, born at Kinrosswood, county of Kinross, March 27, 1746, died there, July 6, 1767. His father was a weaver, but contrived to send him to the university of Edinburgh, to prepare for the ministry. There he struggled with poverty and various discouragements, and became melancholy and consumptive. He finally returned to his native village and died when only 21 years of age, leaving a few poems which were collected and edited by the Rev. John Logan.

BRUCHSAL, a town of Baden, in the circle and m. N. N. E. of Carlsruhe, on the Seilbach, and on the Mannheim and Carlsruhe railroad; pop. in 1871, 9,786. It has a castle which was formerly the residence of the bishop of Spire, a gymnasium, and a hospital of the Brothers of Mercy, with an anatomical museum and an

educational institution. The old castle is now used as a prison, conducted on the Pennsylvania plan.

BRUCIA, a bitter alkaline body, associated with the similar bodies, strychnia and igasuria, in the nux vomica and bean of St. Ignatius. It is crystallizable, soluble in hot and cold water and alcohol, and possesses similar medicinal properties to those of strychnia. As it has only about $\frac{1}{2}$ the strength of strychnia, this is used in preference. It was originally discovered by Pelletier and Caventou in the false Angostura bark.

BRUCK, the name of two towns of Austria. **I. Bruck-on-the-Leitha**, in Lower Austria, on the Vienna and Buda railway, 20 m. S. E. of Vienna; pop. in 1869, 4,203. It has a castle of Count Harrach and manufactories of machinery. Near it is a permanent camp of the Austrian army. **II. Bruck-on-the-Mur**, in Styria, on the Vienna and Trieste railway, 25 m. N. by W. of Gratz; pop. about 4,000. Near it is a celebrated cave.

BRÜCKENAU, a town of Bavaria, at the foot of the Rhön, in the valley of the Sinn, 36 m. N. of Würzburg; pop. in 1867, 1,571. It is situated in the midst of beech forests and beautiful mountain scenery, and contains a royal castle. Near the town is a Franciscan convent; and about two miles distant are the chalybeate baths and springs of Brückenau. There are three springs and a few lodging houses, belonging to the king, and under the charge of an inspector.

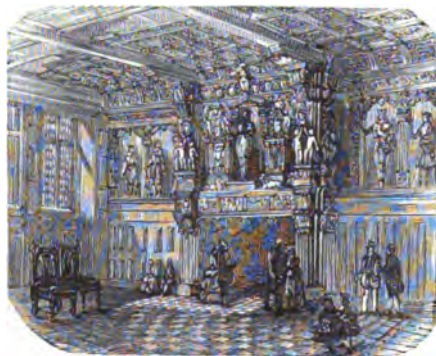
BRUCKER, Jakob, a German scholar, born in Angsburg, Jan. 22, 1696, died Nov. 26, 1770. His chief work is the *Historia Critica Philosophiæ*, from the creation of the world to his own time (5 vols. 4to, Leipsic, 1742-44), which has been frequently abridged, and freely used by historians of philosophy. He wrote several other philosophical and biographical works.

BRUGES (Flemish, *Brugge*), a city of Belgium, capital of the province of West Flanders, situated about 8 m. from the North sea, with which it is connected by the canals of Ostend, Ghent, and Sluis, and 55 m. N. W. of Brussels; pop. in 1869, 47,621, of whom 15,000 were paupers. It has spacious docks and excellent quays. The shipowners of Bruges are engaged principally in fishing and coasting. Lace is the most important branch of manufacture, and there are also manufactories of linen, cotton, and woollen goods, of soap, leather, tobacco, and porcelain. The town presents a quaint aspect, contains about 200 streets, 9 public squares, 54 bridges (which give it its name), and several beautiful fountains. The church of Notre Dame, with a sculptured Virgin and child, erroneously ascribed to Michel Angelo, and a spire 442 ft. high, the cathedral of St. Saviour, and the hospital of St. John are remarkable for the works of art which they contain. The belfry tower in the great square is 290 ft. high, and its celebrated chimes sound at every hour. The other public buildings are



Belfry of Bruges.

the hôtel de ville, containing a public library, the hall of justice, and the prinsenhof, the ancient palace of the counts of Flanders. Bruges has a flourishing free academy of fine arts, a botanical garden, museum, theatre, an agricultural society, an exchange, a commercial and other tribunals, a gymnasium, and a remarkably large number of charitable institutions. The corporation of weavers of Bruges was celebrated in the



Interior of Town Hall.

time of Charlemagne. From the 9th century till the middle of the 14th the town was under the sway of the counts of Flanders, and reached the height of its prosperity in the 15th century, after having passed under the domin-

ion of the dukes of Burgundy. Factories were established here by merchants from 17 states and 20 foreign ministers were accredited to the magistrates. In 1430 Philip the Good instituted the order of the golden fleece in honor of the prosperity of the woollen trade of the town. Bruges was then one of the great commercial emporiums of the world, the central mart of the Hanseatic league, and the chief resort for English, Lombard, and Venetian merchants. It had a large share of the commerce of the globe while its manufactures, especially in tapestries, excelled all others. Hans Memling and his brothers Van Eyck practised their art there. This great prosperity, however, engendered extravagant habits in dress and social life to such an extent that Charles V. was obliged to pass stringent sumptuary laws. The domination of the house of Hapsburg proved fatal to the prosperity of the town. The citizens, who had always been noted for the jealous care with which they guarded their privileges, imposed their first sovereign of that house, the archduke Maximilian, for violating them; and to punish the town the trade was transferred to Antwerp, and its ruin was consummated by the persecutions of the duke of Alva in the latter part of the 16th century, when many of the inhabitants fled to England. The town was on two occasions the asylum of English kings: once when Edward IV. fled from England, and again during the exile of Charles II., the latter inhabiting a house which still stands on the south side of the great square at the corner of the rue St. Amand, bearing the sign, *Au lion belge*.

BRUGES, Roger van, a Flemish painter, pupil of John van Eyck, flourished about the middle of the 15th century. He was probably the same person as Magister Rogel of Flanders, who painted a "chapel" or altarpiece in three compartments, which was presented by John II. of Castile to the Carthusian church at Miraflores in 1445, and which Charles V. used to consult with him in all his expeditions. He was one of the few artists of his time who painted on canvas.

BRUGG, or **Bruck**, a village of Switzerland, capital of a district of the same name in the canton of Aargau, on the Aar, 10 m. N. of Aarau; pop. in 1870, 1,338. It is surrounded by walls, defended by conical towers, and built on a portion of the site of the ancient Vindonissa, some remains of which are still to be seen. About 2 m. from the village are the ruins of the ancient castle of the counts of Hapsburg. The ruined abbey of Königsfelden in the same neighborhood was founded in 1135 by the widow and daughter of Albert, emperor of Germany, who was assassinated on the spot. During the reformation Brugg was called *Prophetenstädtchen*, or the little town of prophets, from the many theologians born there.

BRUGGER, Friedrich, a German sculptor, born in Munich, Jan. 13, 1815, died there, April 18, 1870. He studied at the academy of Munich.

executed in Rome his first statues of egyptological subjects. After his return from Egypt in 1843 he was employed by the Bavarian government in commemorating distinguished egyptians. The mausoleum of the historian Johannes von Müller at Cassel is regarded as one of his masterpieces.

BRUGMANS, Sebaldus Justinus, a Dutch physician and naturalist, born in Franeker, March 1763, died in Leyden, July 22, 1819. He was a member of the academies of Dijon, Bordeaux, and Berlin and received prizes to several of his disquisitions on natural history and botany. Becoming professor of philosophy and physical sciences at Franeker, he promoted the study of natural history in the Netherlands, and founded a museum of comparative anatomy which became famous. King Louis Bonaparte attached him to his service, and being appointed professor of anatomy at Leyden, he also taught there other sciences of natural history and chemistry and organized the sanitary institutions of Holland, in which he was made chief director. After the annexation of Holland to France, Napoleon made him rector of the university of Leyden, which he cleared of debt. He especially improved the condition of military hospitals, and was mainly due to his efforts that relief for 20,000 wounded soldiers was provided after the battle of Waterloo. In 1815 King William appointed him at the head of the sanitary service of the army and navy, and sent him to France to obtain the restitution of the collection of natural history which had been taken away during French domination. He was the chief author of the *Pharmacopœia Batava*, and published numerous writings on medical science and natural history.

BRUGSCH, Heinrich Karl, a German Egyptologist, born in Berlin, Feb. 18, 1827. He early attracted the attention of Alexander von Humboldt and of the king of Prussia by his essays on Egyptology (1848-'50), written while he was at the gymnasium. With their assistance he finished his studies in Berlin. The king defrayed the expenses of his first journey to Egypt (1853). After his return he was appointed director of the Egyptological museum at Berlin. He revisited Egypt in 1857-'8, was historiographer of the Prussian embassy in Cairo in 1860, and after the death of Baron de Tott was for a time Prussian ambassador to the shah. He founded at Leipsic in 1864 a medical school for Egyptian archaeology, which he continued with the assistance of Lepsius during his residence as consul at Cairo (1864-'8). He was professor at Göttingen from 1868 to 1870, and he became director of the Egyptological museum at Cairo. His *Hieroglyphisch-demotisches Wörterbuch* (4 vols., Leipsic, 1867-'9) is one of the great sources of information on ancient Egypt. Among his other works are: *Reise-Notizen aus Aegypten* (1855); *Recueil de monuments égyptiens* (Leipsic, 1862 et seq.); *Hieroglyphische Inschriften alter ägyptischer Gemäler* (2 vols., 1865-'6); *Die ägyptische*

Gräberwelt (1867); and *Die Sage von der geflügelten Sonnenscheibe* (Berlin, 1870).

BRÜHL, Heinrich, count, a German statesman, born at Weissenfels in 1700, died at Dresden, Oct. 28, 1763. Beginning life as a page, he gained rapid promotion until in 1733 he was enabled to secure the crown of Poland for the elector Augustus II. of Saxony. He became prime minister in 1747; but by humoring the costly caprices of the king, and by his own extravagance, he exhausted the public revenue, and covered the kingdom with disgrace. On the death of Augustus, in 1763, he was dismissed from office, and died within a few weeks. The celebrated Brühl palace still remains in Dresden; and his collections form a considerable part of the royal library.

BRUHNS, Karl Christian, a German astronomer, born at Plön, Holstein, Nov. 22, 1830. He was at first a mechanic, but became assistant to the astronomer Encke in Berlin in 1852, graduated at the university in 1856, and in 1860 became professor of astronomy at Leipsic, where he established an observatory. He is the discoverer of a number of comets. Besides many contributions to the *Astronomische Nachrichten*, he has published *Die astronomische Strahlenbrechung in ihrer historischen Entwicklung* (1861), an account of his observations from 1860 to 1865 (1866), and a biography of Encke (1869).

BRUMAIRE, The Eighteenth, the day of the year VIII. in the calendar of the French revolution corresponding to Nov. 9, 1799. On that day was begun the movement which resulted in the overthrow of the directory and the establishment of the consulate in France. Bonaparte, on his return from Egypt, found the government in power as established by the constitution of the year III. It consisted of a directory of five members (Sieyès, Barras, Ducos, Moulins, and Gohier), a senate, or council of the ancients, and the council of 500, or popular legislative branch. The republicans had a majority in the council of 500; these, with the generals Bernadotte, Jourdan, and Angereau, desired to restrain the power of the directory, and remove Barras from it. Sieyès, with a majority of the ancients, wished some less democratic organization. Barras and the other directors were anxious to retain their own power. Bonaparte and his brothers, aided by many soldiers and civilians, were in favor of any change which would throw the power into their own hands. These latter entered into a conspiracy with Sieyès and his friends for the overthrow of the government, and fixed upon the 18th Brumaire as the day for its execution. Sieyès was to manage the council of the ancients; Lucien Bonaparte was to see to the council of 500, of which he was president; Bonaparte undertook the military. At 6 o'clock in the morning of that day the council of the ancients, with the exception of the republican members who had not been notified, were convened at the Tuile-

ries, where Sieyès made a harangue upon the perils of the republic, and the reported plots of the Jacobins to reestablish the reign of terror, and induced the council to place Bonaparte in command of the military in Paris, and to transfer the sittings of both legislative bodies to St. Cloud, where they would be out of danger. Sieyès, Barras, and Ducos resigned as members of the directory, so that there was left no executive authority; but Bonaparte commanded the troops. On the next morning, Nov. 10, the two councils met at St. Cloud. The republican majority in the ancients inveighed against the trick by which they had been left out in the proceedings of the previous day. Bonaparte appeared at the bar to justify his action. He began a violent speech, lost his presence of mind, and became confused, but catching a glimpse of the grenadiers outside, he threatened the council with military violence if they should decide against him. Meanwhile in the council of 500 Lucien Bonaparte read the resignation of the three directors, amid shouts from the members of "No Cromwell! no dictator! the constitution for ever." Bonaparte now entered, accompanied by four grenadiers, and attempted to speak, but was interrupted by cries and execrations, and could utter only a few broken sentences. The members appeared to be on the point of proceeding to violence against him, when a body of soldiers rushed into the hall and bore him off. A motion was made for his outlawry; but Lucien refused to put it, left the chair, and went outside the hall, where he addressed the troops, declaring that a body of factious men in the pay of England, and armed with daggers, had set the deliberations of the representatives of the people at defiance, and that he, as president of the assembly, summoned the military to quell the disturbance. The soldiers hesitated until Lucien swore that he would stab his own brother if he attempted anything against the republic. Murat at the head of a body of grenadiers then entered the hall, and ordered the assembly to disperse. The members replied with shouts and execrations. The drums were then ordered to beat, the soldiers levelled their muskets, and the members of the council made their escape by the windows. Bonaparte had meanwhile gone to Paris, where he said that attempts had been made to stab him; and one person declared that he had received wounds intended for Bonaparte. The council of 500 was dissolved by a vote of about 50 of its members, who also in conjunction with the ancients passed a decree making Sieyès, Bonaparte, and Ducos provisional consuls, and investing them with supreme executive power. The *coup d'état* was merely begun on the 18th Brumaire, and its success was only assured on the 19th.

BRUMATH, or *Brumpt* (anc. *Brocomagus*), a town of Germany, in Alsace, on the river Zorn, 10 m. N. of Strasburg; pop. in 1871, 5,601. Here are a number of tumuli, supposed to be

the remains of a Celtic cemetery, in which have been found a hatchet, knife, ring, and other articles of Celtic origin. Near the town is the insane asylum of Stephansfeld.

BRUMMEL, George Bryan, a celebrated Englishman of fashion, born in London in June, 1774, died at Caen, France, March 29, 1840. He was educated at Eton and Oxford, where, though he displayed some skill in writing Latin verse, he was less distinguished for scholarship than for a fastidious taste in dress, which he gained for him the sobriquet of "Beau Brummel." On the death of his father in 1794 he inherited £30,000, and about the same time became the favorite companion of the prince of Wales, who gave him a cornetcy in his regiment, and rapidly promoted him to a captaincy. Military life not being to his taste, he sold his commission and devoted himself to fashion and fine society. He set up a splendid bachelor establishment at the west end of London, and became the arbiter of taste in fashion, a position which he retained so long as the favor of the prince of Wales and his money lasted. The former he forfeited about 1813, and the latter, replenished occasionally by gambling, gave out soon after; and in the latter part of the next year he fled from his creditors to Calais. After living there some years on such remittances as he could obtain from his friends, he was appointed consul at Caen, where he became reduced to utter penury and died in a hospital for mendicants. See "Life of Brummel," by Captain William Jesse (2 vols. 8vo, London, 1841, 12mo, 1854).

BRUN, Friederike Sophie Christiane, a German authoress, born at Gräfen-Tonna, near Gotha, June 3, 1765, died in Copenhagen, March 25, 1835. The daughter of Balthasar Müntz, a German clergyman and poet, who removed to Copenhagen, she was early remarkable for her linguistic and poetical talents, and married in 1783 the wealthy Danish councillor Constantin Brun, with whom she went to St. Petersburg and to Hamburg, where she formed the acquaintance of Klopstock. She became deaf during the cold winter of 1797-9, and subsequently travelled in various countries, and for some time in company with the princess of Dessau and the poet Matthias. With the latter and with the historian Johannes von Müller she spent some time in Switzerland in the house of Bonstetten, and was afterward for several years her guest in Copenhagen, and who addressed many remarkable letters to her, which have been published. After a long residence in Italy, she spent nearly the last 25 years of her life in Copenhagen, gathering round her many eminent persons. Her husband survived her hardly one year. Her early poems, edited by Matthias, were published in 1795 (4th ed., Zurich, 1806), were followed by *Neue Gedichte* (Darmstadt, 1812), and *Neueste Gedichte* (Bonn, 1820). She described her travels in her *Prosaische Schriften* (4 vols.

sh, 1799–1801), *Episoden* (4 vols., 1807–'18), *Lebens-Geschichte* (2 vols., Leipzig, 1833), and in *Briefe aus Rom*, addressed to her brother, bishop of Seeland, edited by Böttiger (Dresden, 1816; new ed., 1820). Her last work, *Lebens-Geschichte aus Morgenträumen und Ida's ästhetische Entwicklung* (Aarau, 1824), contains a full autobiography and an account of her mother Ida's education.

BRUNCK, Richard François Philippe, a French philologist, born in Strasburg, Dec. 30, 1729, June 12, 1803. He was educated in the college of the Jesuits at Paris, served in Hanover as commissary of war, and returned at the age of 30 to Strasburg, where he studied in the university till he had mastered the Greek language. As an editor he made no commentaries, but occupied himself only with the text. Persuaded that all faults in the language of the Greek classics came from the carelessness of copyists, he corrected the texts with the utmost fearlessness, regardless of manuscript readings. Holding a lucrative official position, he was enabled to issue his editions without depending on a publisher. He edited the Greek anthology, all of the tragedies of Sophocles, and several of those of Æschylus and Euripides, the Greek gnomic poets, and the works of Anaxagoras, Aristophanes, and Apollonius of Rhodes. His labors were interrupted by the French revolution, whose principles he espoused. He was imprisoned during the reign of terror, was ruined in property, and obliged to part with his books. He then turned his attention to Latin authors, and edited Virgil, Plautus, and Terence.

BRUNDISIUM. See BRINDISI.

BRUNE, Guillaume Marie Anne, a marshal of France, born at Brives-la-Gaillarde in 1763, died at Avignon, Aug. 2, 1815. He was educated at Paris for the law, but on the break-out of the French revolution he took the side of the people, received a military appointment, and served under Dumouriez in Belgium. He was commissioned by the committee of public safety to put down the insurrection in the Gironde, which he did with the utmost rigor. He acted under Bonaparte against the revolting sections in Paris, and assisted the directory in putting down the conspiracy in the camp at Grenelle, Sept. 9, 1796. He then entered the army of Italy in the division of Masséna, distinguishing himself by his rapidity, and became commander of the second division, hitherto commanded by Angereau. After the peace of Campo Formio he commanded the army which invaded Switzerland and captured Bonn. He was then sent to Italy, where, July 3, 1798, he forced the king of Sardinia to deliver up the citadel of Turin. In the following year he commanded in Holland, defeated the English and Russians at Bergen, and forced the duke of York to capitulate at Amsterdamm, Oct. 18, 1799. After the 18th Brumaire he was appointed a member of the council of state, and sent against the royalist insur-

gents of Brittany. From 1800 to 1802 he again served in Italy, and was afterward sent as ambassador to Constantinople. In 1804 he returned to France, and was created marshal. In 1807 he received the grand cross of the legion of honor, and was sent to Hamburg as governor of the Hanseatic towns, and as commander of the reserve of the grand army. His conduct in regard to the truce with Sweden displeased Napoleon, and he was recalled in disgrace, and retired into private life. In 1814 he gave his adhesion to the acts of the senate, and received the cross of St. Louis from Louis XVIII. During the hundred days he became again a Bonapartist, and received the command of a corps of observation on the Var. After the battle of Waterloo he proclaimed King Louis XVIII., and while on his way from Toulon to Paris he was killed by a royalist mob at Avignon. His body was dragged through the streets and then thrown into the Rhône. In 1841 a monument was erected to him in his native town.

BRUNHAUT, or *Brunechild*, queen of Austrasia, born in 534, killed in 613. The daughter of Athanagild, king of the Visigoths of Spain, she married about 567 Sigebert, king of Austrasia. Chilperic, king of Neustria, brother of Sigebert, having married Galsuinda, daughter of Athanagild, abandoned and murdered her at the instigation of his mistress Fredegonda, whom he had made his queen. Brunehaut persuaded her husband to invade Neustria. The invasion was successful, but while besieging Tournay Sigebert was assassinated in 575 by emissaries of Fredegonda. The Austrasian army dispersed, and Brunehaut fell into the hands of Chilperic, and was taken to Rouen. There she induced Meroveus, one of the sons of the Neustrian king, to marry her, and favored by Pretextatus, bishop of Rouen, effected her escape to Austrasia, then governed by her son Childebert. She succeeded in recovering her authority, and in 587 concluded with Gontran the treaty of Andelot, which fixed the limits between Austrasia and Burgundy. After the death of Childebert in 596, the nobles prevented her from ruling in the name of her grandson, Theodebert II.; but another of her grandsons, Thierry II. of Burgundy, made her mistress of his affairs. She quickly kindled a war between the two brothers. Theodebert was vanquished at Toul and at Tolbiac, and slain with his family in 612. Thierry suddenly died soon after, and Brunehaut seemed about to ascend the throne again, when she was opposed by Clothaire II., son of Fredegonda, at the head of an army of Burgundians and Austrasians. She encountered the enemy on the banks of the Aisne, but her troops refused to fight, and Brunehaut fell into the hands of the son of Fredegonda, who reproached her with having caused the death of ten kings or sons of kings, exposed her for three days to torture and to the insults of the soldiers, and then bound her by a foot and an arm to the tail of a wild horse.

Her remains were burned, and the ashes scattered to the winds. She has been diversely judged by historians, being by some accused of monstrous crimes, and extravagantly praised by others.

BRUNEL. I. Sir Mark Isambard, a civil engineer, born at Hacqueville, near Rouen, France, April 25, 1769, died in London, Dec. 12, 1849. He was the son of a farmer, was educated at Rouen, studied drawing, hydrography, and mathematical sciences, and in 1786 entered the merchant service, and made several voyages to the West Indies. In 1798, for political reasons, he fled from France to New York, where he undertook the exploration and survey of some lands on Lake Ontario for a French land company, and in 1794 commenced the survey of the Champlain canal. He sent in a design for the national capitol, which involved too much expense, and was therefore rejected; and he was much employed as an engineer and architect in New York. After a stay of some years in America, he went to England, where he invented complicated machinery for cutting the blocks used in the rigging of ships, which was secured at a large expense for the royal dockyards. He invented many other useful machines, and was constantly employed upon important architectural and engineering works. His greatest achievement was the construction of the Thames tunnel, commenced in 1825, and completed, after immense difficulties and several disasters, in 1843. In 1829 he received the cross of the French legion of honor, and in 1841 was knighted. He was a member of the royal society, and corresponding member of the French institute. II. Isambard Kingdom, an English engineer and naval architect, son of the preceding, born at Portsmouth, April 9, 1806, died Sept. 14, 1859. He was educated in the college of Henry IV. at Caen, and was resident engineer, under his father, of the Thames tunnel. He was long occupied in perfecting an engine designed by his father, the motive power of which was carbonic acid gas. This was abandoned on economical grounds, although the machinery was brought to high perfection. In 1833 he was appointed chief engineer of the Great Western railway, and he designed and constructed the numerous bridges, viaducts, and tunnels on the entire line and its branches. Among his works are the Box tunnel near Bath, and the Hungerford suspension foot bridge over the Thames, which has the longest span of any in England. He constructed the Great Western steamship, the first which regularly traversed the Atlantic, the Great Britain, the first ocean screw steamer, and the Great Eastern, the largest steamer ever built. He also took part in the floating and raising of the Conway and Britannia tubular bridges, constructed some of the most important docks on the English coast, conducted the works of the Tuscan portion of the Sardinian railway and of other foreign railways, and during the Crimean war had the entire charge of estab-

lishing and organizing the hospitals on the Dardanelles. He was elected a fellow of the royal society in 1830, and was vice president of the institution of engineers and of the society of arts, and chevalier of the legion of honor.

BRUNELLESCHI, Filippo, an Italian architect, born in Florence in 1377, died there in 1461. He was apprenticed to a goldsmith, afterwards devoted himself to sculpture, and finally became the leading architect of his day in Italy. He studied the ancient architecture of Rome, and is credited with reviving the Doric, Ionic, and Corinthian orders, and settling the principles of perspective as applied to architecture. He constructed the dome of the church of Santa Maria del Fiore at Florence, the largest in diameter in the world, and designed the Pitti palace, the churches of San Spirito and San Lorenzo, and the abbey at Fiesole.

BRUNET, Jacques Charles, a French bibliographer, born in Paris, Nov. 2, 1780, died there Nov. 16, 1867. The son of a bookseller, he devoted himself to the study of bibliography, and made several catalogues of old libraries. His most important work is the *Manuel du libraire et de l'amateur de livres* (3 vols. 8vo. 1810). The 5th edition (7 vols. 8vo. Paris, 1867) is the most complete work on bibliography ever produced. He also published *Recherches sur les éditions originales des œuvres du roman satirique de Rabelais*, and several other works. In 1848 he received the decoration of the legion of honor.

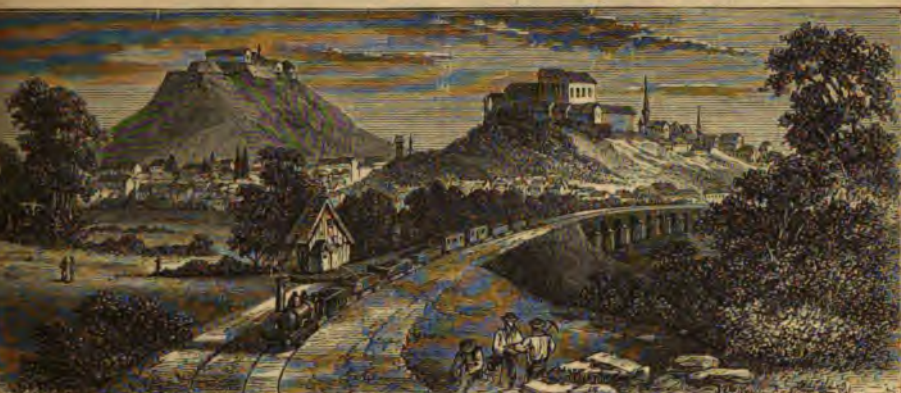
BRUNI, Leonardo, called ARETINO, an Italian author, born in Arezzo in 1369, died in Florence, March 9, 1444. For about ten years he was secretary of the papal chancery, except in 1410, when he was for a short time chancellor of the Florentine republic. His career at the Vatican was terminated by his marriage in 1412, and three years later he went to Florence where he again became chancellor. Here he completed his Latin *Historia Florentina* (Italian translation, Venice, 1473). He retained the chancellorship for 17 years, and was the most among the celebrated scholars who resided in the palace of Cosmo de' Medici. His Italian writings marked a new era in the improvement of the language, and his Latin translations of Greek authors contributed greatly to the revival of classical learning. His history of the Goths, *De Bello Italico adversus Goths* (Foligno and Venice, 1470-71), is regarded as his best work. It was reprinted with additions, from whom it is chiefly taken, and with other histories of Gothic wars (Basel, 1548; Paris, 1584). His *Epistolæ Familiæres* (two complete editions, by the abbé Mehus, Florence, 1731, with Bruni's biography and a full catalogue of his works) give valuable information respecting the literature of the 15th century. He wrote biographies of Italian Dante and Petrarch, and of Cicero in Latin and Italian. His novel, *De Amore Guistardi Sigismunda Filia Tancredi*, taken from Boccaccio's Decameron, has been translated into English.

in William Walter's "Amorous History of
Cystarde and Sigismonde, and of thyr dolor-
ous Deth" (London, 1532).

BRÜNINGS. I. Christian, a Dutch engineer,
born at Neckarau, Germany, Nov. 8, 1736,
died in Holland, May 16, 1805. He was col-
lector of river tolls, and became in 1769 chief
inspector of hydraulic works under the Nether-
lands government. He improved the dikes
and the drainage of the lake of Haarlem, took
prominent part in preventing inundations
and in improving the bed of the Rhine and
other rivers, and published valuable reports
relating to those enterprises. The Dutch re-
public proposed to erect a monument to him in
the cathedral at Haarlem, and awarded a gold
medal to the author of the best essay on his
services. **II. Another Dutch engineer**, of the
same name and family, died in Leyden, March
1826. He was author of a *Dissertation*
sur l'angle le plus avantageux des portes d'une
cluse (1797). **III. Conrad Louis**, likewise a Dutch

engineer, born at Heidelberg in 1775, died in
Nimeguen in 1816. He was employed by the
Dutch government as inspector of hydraulic
works, was a member of the institute, and
author of various writings on hydraulic en-
gineering and kindred subjects.

BRÜNN (Czech, *Brno*, a ford), a city of Mo-
ravia, Austria, situated on a declivity at the
confluence of the Schwarza and the Zvittawa,
70 m. N. of Vienna, and 116 m. S. E. of
Prague; pop. in 1870, 73,464. Fortifications
separate the city from the suburbs, of which
there were 20 in 1871. It was formerly de-
fended by the castle of Spielberg, which stands
on a high hill just back of the town. Since
the demolition of the defences by the French
in 1809, the castle has been converted into a
state prison, in which were confined Silvio
Pellico and other political offenders. The
most notable buildings are the cathedral of St.
Peter; the church of St. James, with a spire
about 300 ft. high, built between 1314 and 1480;



Brünn.

the *Landhaus*, formerly an Augustinian con-
vent; the barracks, once a Jesuit college; the
protestant church, built in 1867; the Hebrew
temple; the palaces of Prince Dietrichstein
and Prince Kaunitz, and the bishop's palace.
A public park, the *Augarten*, was opened by
Joseph II., and in the public gardens of the
Pranzenburg quarter are a monument to the
emperor Francis I., and an obelisk commemo-
rating the peace of 1815. The Zderad monu-
ment—one of the most ancient of Moravia—
stands outside of the town. Brünn is a bishop's
see, and the seat of the principal law and mili-
tary courts for Moravia. There are two gym-
nasia, one German, the other Czech, a theo-
logical faculty, a technical academy, a normal
school, a museum, a public library, botanical
gardens, and institutions for the blind and for
the deaf and dumb. In 1871 there were 23
literary and scientific societies, and 17 journals
and periodicals. The city has repeatedly been
destroyed by fire, and in 1558 the plague car-
ried off 4,000 of the inhabitants, to whose
memory a column has been raised in the great

square. The principal industry is the manu-
facture of wool, the most extensive establish-
ment employing 160,000 spindles. Woollens
are exported to Italy, Germany, and the United
States, over 700 firms being engaged in this
trade, and nearly 200 steam engines with over
4,000 horse power and an annual amount of
2,000,000 cwt. of coals are employed in it.
Machinery and various other articles are also
manufactured here.

BRUNN, Heinrich, a German archaeologist,
born at Wörlitz, Anhalt, Jan. 23, 1822. He
graduated in Rome in 1843, and after extensive
explorations in Italy he succeeded Emil Braun
in 1856 as secretary of the archaeological insti-
tute in Rome. Since 1865 he has been profes-
sor of archaeology and director of the collection
of coins in Munich, and since 1867 director of
the collection of vases. His works include
Geschichte der griechischen Künstler (2 vols.,
Stuttgart, 1853-'9), and *I rilievi delle urne*
etrusche (Rome, 1870).

BRUNNEN, a village of Switzerland, in the
canton and 3 m. S. W. of Schwytz, near the

mouth of the Muotta, on the lake of Lucerne; pop. in 1870, 1,774. It is memorable as the spot where the deputies of the three original cantons, Schwytz, Uri, and Unterwalden, shortly after the battle of Morgarten, laid the basis of the Swiss republic, in December, 1315.

BRUNNER, or **Brunn**, **Johann Conrad**, a German anatomist, born near Schaffhausen, Switzerland, Jan. 16, 1653, died at Mannheim, Oct. 2, 1727. He was professor in the university of Heidelberg, afterward physician to the elector palatine, and was ennobled under the name of Bruno von Hammerstein. He made many original researches, particularly on the pancreas and on the glandular follicles of the small intestine. Those of the duodenum, first accurately described by him, are still known under the name of Brunner's glands.

BRUNNER, **Sebastian**, a German ultramontane author, born in Vienna, Dec. 10, 1814. He was ordained in 1838, and, after holding minor clerical offices, was appointed in 1853 chaplain of the university of Vienna, where he had studied theology. His denunciation of liberal tendencies proved congenial to Prince Metternich, who employed him on various occasions. In 1848 he founded the *Wiener Kirchenzeitung*. His *Nebelfungen-Lied*, a satire against Hegelianism, passed through four editions between 1845 and 1857. He described his travels in humorous sketches, and in 1858 published his autobiography under the title of *Woher? Wohin?* (2 vols.). His *Clemens Maria Hofbauer und seine Zeit* (1858), and *Die Kunstgenossen der Klostersgeschichte*, are among his most valuable productions, on account of the ecclesiastical and artistic data which they contain. He began in 1863 to publish a complete edition of his prose and poetical works, to consist of 20 volumes. Among his miscellaneous theological publications, one is directed against Renan's "Life of Christ" (1864).

BRUNNOW, **I. Ernest Georg von**, a German novelist and advocate of homœopathy, born in Dresden, April 6, 1796, died there, May 4, 1845. He was a lawyer and judicial officer at Dresden, but having in 1818 been cured of a disease of the eyes by Hahnemann's treatment, he resigned his position in 1822 and devoted himself to medicine and the dissemination of the principles of homœopathy. He took a prominent part in the foundation of a homœopathic association in Germany, and translated Hahnemann's *Organon der Heilkunde* into French, and, in conjunction with Stapf and Gross, his *Reine Arzneimittellehre* into Latin. In 1844 he wrote *Ein Blick auf Hahnemann und seine Homœopathie*. He was also the author of some lyrical poems and novels. **II. Philipp**, count, a Russian diplomatist, brother of the preceding, born in Dresden, Aug. 31, 1797. He entered the Russian service in 1818, became ambassador at London in 1840, and remained there till after the outbreak of the Crimean war. In 1855 he was sent to Frankfort as envoy to the German diet, the emperor Nicholas being displeased

with his having deceived him in regard to the peaceful disposition of the English cabinet. In the negotiation of the treaty of Paris, 1856, he assisted as one of the Russian plenipotentiaries, and in September he became ambassador at Berlin, continuing till March, 1858, when he resumed his former post in London. In 1871 he strove to promote the interests of Denmark at the conferences in London, and in 1871 he attended the conference for the denaturalization of the Black sea. In the same year he was promoted to the rank of count, after more than 50 years' diplomatic service.

BRUNO THE GREAT, archbishop of Cologne and duke of Lorraine, son of Henry I., emperor of Germany, born in 925, died at Rheims, Oct. 11, 965. He was raised to his dignities by his brother, the emperor Otho I., whom he accompanied on his first expedition to Italy, and was equally distinguished for learning, eloquence, and charity. There are attributed to him commentaries on the Gospels and the Pentateuch, and several lives of saints.

BRUNO, **Saint**. **I.** The apostle to the Prussians, born of a noble Saxon family at Querfurt in 970, killed in 1008. He was an Italian Benedictine, succeeded St. Adalbert in his missionary labors, was active in Poland among the Petchenegs, became chaplain of the emperor Henry II., and was assassinated by the pagans on the confines of Lithuania.

II. Founder of the order of Carthusians, born of a noble family at Cologne about 1040, at La Torre in Calabria in 1101. Refusing the metropolitan see of Rheims, he forsook the world for the practice of asceticism in the mountain wilds between France and Italy. The order which he founded derives its name from his abode, a desert place called Chartreuse, near Grenoble, where in 1084 he gathered a small community and established rules of a severe austerity. He was invited to Rome in 1089 by Pope Urban II., who had formerly been his disciple, refused the ecclesiastical dignities that were offered him, died in the monastery which he had founded, and was canonized in 1514.

BRUNO, **Giordano**, an Italian philosopher, born at Nola, near Naples, about the middle of the 16th century, burnt at the stake in Rome, Feb. 17, 1600. He entered the Dominican order at an early age, but, becoming skeptical, was forced to leave it, and fled to Geneva in 1588. His ideas were no more acceptable to the Calvinists than to the Catholics, and after two years he went to Paris, where he gained some celebrity by writing a satirical comedy, *Il candelajo*, and delivering lectures on the *Magna* of Raymond Lully. His attacks on the philosophy of Aristotle aroused much hostility among the scholars and clergy of Paris, and in 1583 he went to England, where he enjoyed the friendship of Sir Philip Sidney, and wrote some of his most important philosophical works. In 1585 he returned to Paris, and the next year went to Germany. After a brief

stay at Marburg, he settled at the university of Wittenberg as a lecturer on philosophy and mathematics. He remained there only two years, after which he went from one university to another, lecturing in turn at Prague, at Helmstedt, and at Frankfurt, until, in 1592, he ventured to return to Italy. During a visit to Venice, he was arrested by the inquisition on May 23, and in 1593 was delivered to the Roman authorities. In Rome he was imprisoned for seven years, tried, degraded, excommunicated, and finally handed over to the civil power, by which he was sentenced to death. (See Berti, *Vita di Giordano Bruno*, Florence, 1868.) He was a man of great mental activity and boldness of thought. Montaigne excepted, there is no philosopher of the 16th century who has been so frequently a subject of research and comment by modern scholars as Giordano Bruno. Descartes borrowed largely from him, and Spinoza's system would appear almost like Bruno's, refined in the logical crucible of Descartes. Even with some philosophers of the present century Bruno has been a favorite. One of the profoundest works of philosophy bears the name of Bruno on its title ("Bruno, or the Divine and the Natural Principle of Things"), and this once more directed the general attention of scholars to Bruno's works, which had become extremely rare. They have been republished since then, those in Italian by Wagner (*Opere di Giordano Bruno*, 2 vols., Leipsic, 1830), those in Latin (*Jordanus Brunus Nolani Scripta quæ latine redegit*), by Gfrörer, in his *Corpus Philosophorum* (Stuttgart, 1834). Of his satires the best are the *Spaccio della bestia trionfante* ("Exclusion of the Triumphant Beast"), and the *Abala del cavallo Pegaseo coll' aggiunta del uisino Cillenico*, a satirical eulogy on ignorance. The *Cena delle Ceneri* ("Table Talk on Ash Wednesday") is a spirited dialogue in defence of the Copernican theory. Those works in which he developed his philosophical views are the essays *Della causa, principio ed uno*, *Dell' infinito universo e mondi*, and *De Monade, Numero et Figura*.—In his system there are but one fundamental principle, one substance, whose existence is real and original. This eternal and infinite being produces by contraction or expansion innumerable apparitions, whose existence is but secondary, merely a shadow of that of the original being. God and the universe are identical; the universe is infinite. Every being or thing (*ens*) has, besides the innermost principle of its existence, a cause of existence. While the former is the immediate condition, the latter is the immediate source of existence. The original cause is the universal intellect which shapes and moulds matter into individual forms. In the harmonious perfection of the universe all possible forms would obtain real existence in all portions of matter. Every form being the result of an intellectual action, and matter being conceivable only under some form or other, it follows

that everything is living or has its soul, which is its form. The substance of all existing beings is one and the same; it is only the forms brought forth by the intellectual activity of the original substance which show differences of appearance. The universe, considered as a whole, is a unit, infinite, immovable, the absolute identity of possibility, reality, and action. This grand unit of all substances, of which all beings and things are only secondary manifestations, is God; God is the monad of the monads. Man, as an intermediate being between time and eternity, belongs to both spheres at the same time, the spiritual and the sensual; but his principal aim is the mind and intellect. The human mind is an integral portion of the divine substance; the perception of the supreme truth, the volition of the supreme good, are its goal. From the narrow sphere of common life, man ought to rise to a conception of his relation to the universe, and of the affinity of his spiritual being to the universal intellect.

BRUNSWICK. I. A S. E. county of Virginia, bordering on North Carolina, watered by the Nottoway, Roanoke, and Meherrin rivers; area, 600 sq. m.; pop. in 1870, 13,427, of whom 8,902 were colored. A large portion of the land is exhausted by the tobacco culture, but has been improved by the use of guano. The chief productions in 1870 were 44,809 bushels of wheat, 166,892 of Indian corn, 68,283 of oats, and 1,121,480 lbs. of tobacco. There were 859 horses, 1,540 milch cows, 3,917 other cattle, 2,582 sheep, and 7,256 swine. Capital, Lawrenceville. II. A S. E. county of North Carolina, bordering on South Carolina, washed by the Atlantic, and drained by Cape Fear and Waccamaw rivers; area, about 1,100 sq. m.; pop. in 1870, 7,754, of whom 3,306 were colored. The surface is level, and much of it swampy. The soil is poor and sandy, but capable of producing rice and cotton to some extent. Pine timber, tar, and rosin are exported in considerable quantities, and the cypress and juniper grow in the swamps. The Wilmington and Weldon, and the Wilmington, Columbia, and Augusta railroads pass through the county. The chief productions in 1870 were 56,211 bushels of Indian corn, 129,168 of sweet potatoes, 119 bales of cotton, and 748,418 lbs. of rice. There were 372 horses, 2,777 milch cows, 4,295 other cattle, 3,555 sheep, and 10,485 swine. Capital, Smithville.

BRUNSWICK. I. A town and village of Cumberland co., Me., on the right bank of the Androscoggin river, at the head of tide water, 30 m. by railroad N. N. E. of Portland; pop. of the town in 1870, 4,687; of the village, 1,449. A bridge over the falls unites it with Topsham, and another bridge is used by the Kennebec and Portland railroad. The Androscoggin railroad connects it with Augusta, 30 m., and the Bath branch with Bath, 9 m. distant. The falls of the Androscoggin furnish ample water power. The town contains a

cotton mill, two flour mills, a bleachery, a tannery, and many other factories. It is the seat of Bowdoin college, and has 11 churches, 3 national banks, and a weekly and a bi-weekly paper. Much capital is invested in shipping. II. A town, port of entry, and the capital of Glynn co., Ga., situated on a bluff on Turtle river, 70 m. S. S. W. of Savannah; pop. in 1870, 2,348. It has a spacious and secure harbor, with 13 ft. of water over the bar at low tide, and a lighthouse on St. Simon's island, 8 m. below. The entrance to St. Simon's sound, through which the Turtle river enters the Atlantic, is about 10 m. W. of the town. For the year ending June 30, 1871, the value of imports from foreign countries was \$291,418; exports, \$330,116. A weekly newspaper is published here. The town is the terminus of the Macon and Brunswick, and the Brunswick and Albany railroads.

BRUNSWICK (Ger. *Braunschweig*). I. A duchy of N. W. Germany, composed of three large portions, separated from each other chiefly by Prussian territory: 1, the principality of Wolfenbüttel, embracing the circles of Brunswick, Wolfenbüttel, and Helmstedt; 2, the district of the Hartz and the Weser, embracing the circles of Gandersheim and Holzminden; 3, the principality of Blankenburg, on the lower Hartz. Besides these three large portions, there are five small isolated districts. Its area and population in 1871 were as follows:

CIRCLES.	Area, square miles.	Population.
1. Brunswick.....	210	90,845
2. Wolfenbüttel.....	295	60,789
3. Helmstedt.....	308	58,705
4. Gandersheim.....	212	42,322
5. Holzminden.....	222	41,561
6. Blankenburg.....	158	22,523
Total.....	1,425	311,715

Of the inhabitants 97·96 per cent. are Protestants, 1·68 Catholics, and 0·36 Jews. The Protestants, with the exception of 1,700 Reformed, are Lutherans. The general character of the surface is hilly, and in the mountainous districts the climate is severe and the harvest late. About 33 per cent. of the land is arable; 27 per cent. consists of meadows, and 32 of woodland. The largest rivers are the Ocker, Leine, and Weser, the last of which drains the greater part of the duchy and has many affluents. Brunswick may be divided into the mining districts, which lie chiefly among the Hartz mountains, and the agricultural regions, which comprise nearly all the rest of the country. Grain, fruit, tobacco, flax, cattle, and horses are raised in the latter, while the former are rich in gold, silver, copper, lead, iron, sulphur, and coal. The mines, in some of which Hanover has a joint interest, are not now so productive as in former times, but are still of high value. Other minerals, such as marble, alabaster, limestone, gypsum, potter's clay, asbestos, asphaltum, jasper, and agate, are found in various

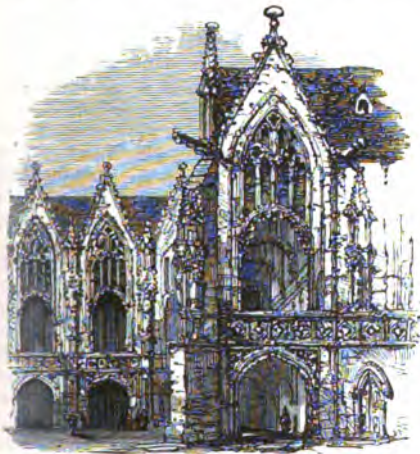
localities. Salt is obtained in abundance. The manufactures are inconsiderable. Spinning is a favorite occupation, and there are several camlet manufactories, dye houses, paper, oil, and saw mills, breweries, iron works, and manufactories of lacquered wares and porcelain. The advantages of railway communication with Hanover, Magdeburg, and Neustadt have given to trade a magnitude scarcely to be expected from the geographical position of the country. The aggregate length of railways in 1871 was 131 m. The university of Helmstedt was suppressed in 1809, but there are 5 gymnasia, a polytechnic school, a theological seminary, 3 normal, 21 Latin, and 369 common schools, and a library at Wolfenbüttel, of considerable repute.—The form of government is a limited hereditary monarchy, the supreme power being vested in the duke and a legislative body of one chamber, consisting of 46 members, of whom 21 are chosen from the owners of large landed estates and the highest taxpayers, 10 from the towns, 12 from the rural districts, and 3 representatives of the church. They are elected for 3 years, one half going out of office every three years. They assemble triennially on convocation by the duke, but in certain cases may meet without his authority. The duchy holds the 11th place among the states of the German empire; has two votes in the federal council, and elects one delegate to the Reichstag. To the army of the empire it contributes a regiment of infantry, a regiment of hussars, a battery of 4 pieces of ordnance, and two landwehr battalions. The public debt in 1871 was 23,765,768 thalers, including 19,670,700 thalers for railways; and the budget for the three years 1870-'72 presented an aggregate revenue of 7,196,400 thalers, and the same aggregate amount of expenditure. II. A city, capital of the above described duchy, situated on the Ocker, 32 m. E. S. E. of Hanover, and connected by railways with the other cities of Germany; pop. in 1871, 57,882. It is said to have been founded in the 9th century, by Bruno, second duke of Saxony, was enlarged by Henry the Lion, ranked in the 13th century among the first cities of the Hanseatic league, and, although much less important than in former times, continues to be one of the most active cities of N. W. Germany. The annual fairs held here are, after those of Leipsic and the two Frankforts, the most animated in Germany. The pork sausages of Brunswick (*Braunschweiger Würst*), and its beer, have acquired great celebrity; the latter is known under the name of *Braunschweiger Mumme*, after Christian Mumme, who was the first to prepare it in 1492. The trade in this beer extended in former years to India. The book trade is of great importance. Brunswick is the seat of a bank and of several banking establishments. The appearance of the town is antiquated, but there are several handsome streets and promenades. The new ducal palace is a magnificent building, with beautiful pleasure grounds. The most interesting monuments of

the ancient cathedral of St. Blaise are the tombs of the ducal family. There are 10 churches and a synagogue. The Gewandhaus, in the old



Gewandhaus.

German style of architecture, and the council house, an elaborate Gothic structure, are among the most picturesque buildings. The museum



Council House.

the arsenal contains a gallery of valuable paintings. The most prominent institution of learning, the *Collegium Carolinum*, which was

founded in 1745, was in 1861 converted into a polytechnic school. The city has also a Lutheran gymnasium, a *Realgymnasium*, an institution for the blind, and one for the deaf and mute. Monuments have been erected to the two dukes of Brunswick who fell at Jena and at Quatre Bras; to the memory of Schill and his companions, 14 of whom were shot here; and to Lessing, who died here. Reitschel's statue in honor of Lessing was erected in 1853. The most extensive of the many charitable and sanitary institutions is a great asylum which accommodates 250 orphans.

BRUNSWICK, House of, one of the oldest families in Germany, a branch of which occupies the throne of Great Britain. The Brunswick territory, then forming a part of Saxony, was by Charlemagne united to the Frankish empire, and with the other Saxon provinces was governed successively by the princes of the house of Saxe, Billung, Supplingenburg, and Guelph. The Guelph house, of mixed Italian and German origin, obtained, in the person of Otho the Young, in 1235, the city of Brunswick as a fief of the empire, which with its dependencies was then first erected into a duchy. The two sons of Otho, Albert and John, reigned in common from 1252 to 1267, and then divided the paternal inheritance. John received the city of Hanover and the duchy of Lüneburg; Albert, the duchy of Brunswick, the Hartz, and the district of the Weser; the city of Brunswick remained common property. John and Albert thus founded the elder branches of Lüneburg and Wolfenbüttel. The former of these became extinct in 1369, and its possessions reverted to the latter. Albert left three sons, Henry, Albert the Fat, and William, who divided the inheritance, and founded the three lines of Grubenhagen, Göttingen, and Wolfenbüttel. The first of these divided into two branches in 1361, both of which became extinct in 1596, and their possessions returned to the Wolfenbüttel line. The Göttingen branch became extinct in 1463, and its possessions were transferred to the duke of Kalenberg. From the Wolfenbüttel branch sprang in 1409 the two new branches of Lüneburg and Wolfenbüttel-Kalenberg, the latter of which in 1634 transferred its possessions to the duke of Brunswick-Lüneburg-Dannenberg, a descendant of the Lüneburg branch. The Lüneburg branch had divided in 1569, and had another offshoot in the family of Brunswick-Lüneburg, which has furnished the electoral and royal dynasty of Lüneburg-Hanover. Henry, duke of Brunswick-Lüneburg-Dannenberg, who died in 1598, was the founder of the present dynasty of Brunswick. His line was divided in 1666 into the branches of Brunswick-Wolfenbüttel and Brunswick-Bevern, the former of which became extinct in 1735, the possessions passing to the latter, which has retained them undivided from that time to the present. Among the queens belonging to this family have been Sophia Dorothea, wife of

George I., king of England; Amelia Elizabeth Caroline, the wife of George IV.; and Sophia Charlotte and Sophia Dorothea, queens of Prussia, the latter the mother of Frederick the Great. The first wife of Leopold I. of Belgium was Charlotte Augusta, daughter of Queen Caroline of England. The following are the most prominent members of the family. **I. Ernest**, duke of Brunswick-Lüneburg, born June 26, 1497, died June 11, 1546. He embraced the doctrines of Luther, signed the confession of Augsburg, and adhered to the Smalcaldic league. His eulogy was pronounced by Melancthon. **II. Christian**, duke of Brunswick-Lüneburg, born Sept. 10, 1599, died June 9, 1626. In the thirty years' war he enthusiastically espoused the cause of the elector palatine Frederick V., elected king of Bohemia. After the flight of that prince from Prague in 1620 he ravaged Hesse and the electorate of Mentz, was defeated by the imperialists on the Main, entered the service of the Dutch in 1622, and forced the Spaniards to raise the siege of Berg-op-Zoom, but was afterward again defeated by Tilly. His motto was, "Friend of God, enemy of priests." **III. Ernest Augustus**, duke of Brunswick-Lüneburg, and first elector of Hanover, born Nov. 20, 1629, died Jan. 28, 1698. He became bishop of Osnabrück in 1662, travelled extensively, and was distinguished as a general and diplomatist. He served the emperor Leopold I. in his war against France, for which he was rewarded with the electoral dignity in 1692. By his marriage with Sophia, daughter of the elector palatine Frederick V., and granddaughter of James I., king of England, his house obtained a right to the throne of England. His son George Louis became king of England in 1714 under the name of George I. **IV. Ferdinand**, duke of Brunswick, a general in the seven years' war, born at Brunswick, Jan. 11, 1721, died July 3, 1792. He entered the Prussian army in 1740, assisted at the capture of Prague, obtained in 1757 the command of the Anglo-Hanoverian army in Westphalia, defeated the French at Crefeld and at Minden, and in 1763, by reason of a disagreement with Frederick the Great, retired to his castle at Vechelde, where he occupied himself with freemasonry and with the encouragement of the fine arts. **V. Charles William Ferdinand**, duke of Brunswick, a Prussian general, born at Wolfenbüttel, Oct. 9, 1735, died near Altona, Nov. 10, 1806. His services during the seven years' war were celebrated by Frederick the Great in a poem. He participated in the battle of Crefeld in 1758, and in 1787 marched into Holland to restore the hereditary stadtholder. After the treaty of Pilnitz he was intrusted with the command of the allied armies against France. He published at Coblenz, July 15, 1792, his famous manifesto, threatening to march directly upon Paris, cut off supplies, and reduce that city by famine. He penetrated into Champagne, but was obliged after the engagement at Valmy to conclude an armistice with Dumouriez. In

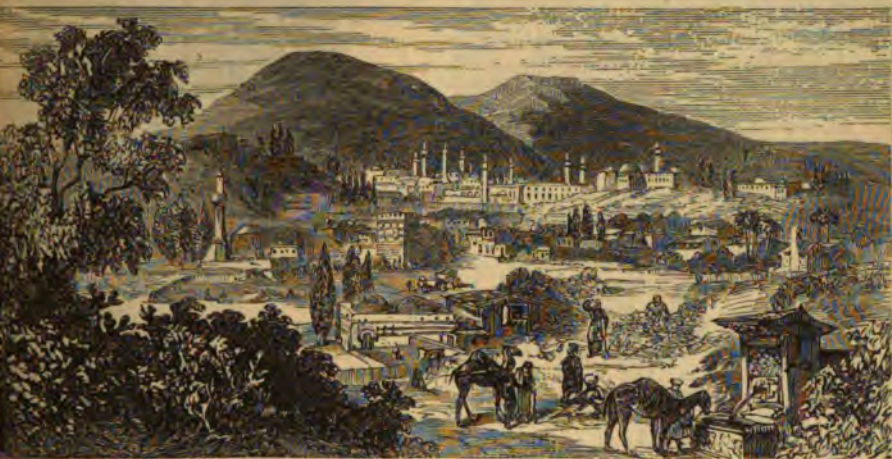
1793 he commanded the army of the Rhine, reappeared in 1806, after an interval of retirement, at the head of the Prussian army, and commanded at the battle of Auerstädt, where he was mortally wounded. **VI. Frederick William**, duke of Brunswick, fourth son of the preceding, a Prussian general in the Napoleonic wars, born Oct. 9, 1771, fell in the battle of Quatre-Bras, June 16, 1815. He became duke of Oels and Bernstadt in 1786, and succeeded to the dukedom of Brunswick after the death of his eldest brother and the abdication of the two others in 1806. At the head of a body of hussars, which he raised in Bohemia, he entered upon the campaign of 1809, was obliged by Rewbell to retreat, and to take refuge with his army in England, where he was received with distinction. He returned to his country in 1813, and fell two days before the battle of Waterloo. **VII. Charles Frederick Augustus William**, duke of Brunswick, son of the preceding, born at Brunswick, Oct. 30, 1804, died at Geneva, Aug. 19, 1873. His education was very imperfect; he paid but little attention to public affairs; and after his assumption of power upon attaining his majority in 1823, his rule was so negligent and arbitrary that he was expelled by an insurrection, Sept. 7, 1830, declared incapable of governing by the German diet, Dec. 2, and formally deposed by a family council, April 25, 1831, in favor of his young brother William (Augustus Louis William Maximilian Frederick, born April 25, 1831, who had previously governed in his name). Afterward resided mostly in Paris and London, making himself conspicuous by his eccentricities, his revolutionary manifestoes, and especially his extraordinary precautions for the protection of a valuable collection of jewels.

BRUNSWICK GREEN, a compound of chloride and oxide of copper and water, prepared by oxidizing metallic copper in the air, by sprinkling it with a mixture of sulphate of copper, common salt, and water. It is also generated by the corrosion of copper in sea water. Its composition, as given by Berzelius, is one equivalent of the chloride and three equivalents of the oxide of copper. An artificial bicarbonate of copper, or mountain green, is also sometimes called Brunswick green. They are both used as pigments.

BRUNTON, Mary Balfour, an English novelist, born in the island of Barra, in the Orkneys, Nov. 1, 1778, died in Edinburgh, Dec. 11, 1818. At the age of 20 she married the Rev. Alexander Brunton, a minister of the Scottish church, and subsequently professor of oriental languages in the university of Edinburgh. In 1811 she published a novel, "Self-Control," which obtained immediate popularity from its moral tone, as well as its literary merits. This was followed by "Discipline" (1814), which was equally successful. Some months after her death her husband published a volume of her "Remains," with a memoir of her life and extracts from her correspondence.

BRUSA, or **Broussa** (anc. *Prusa* or *Prusias ad Olympum*, from being situated at the foot of the Bithynian Olympus), a city of Asia Minor, capital of the Turkish vilayet of Khodavendikar, 57 m. S. of Constantinople, and 15 m. E. of the sea of Marmora; pop. in 1855, 2,907, of whom 64,087 were Mohammedans, 173 Greeks, 9,243 Armenians, and 2,404 Jews. It is the residence of a Greek and an Armenian archbishop, and has an extensive trade with Aleppo and Smyrna, chiefly in carpets, cloths, silks, and satins, which are largely manufactured in the town. In the vicinity

are noted thermal springs. An earthquake, Feb. 28, 1855, destroyed the greater part of the town, ruined 80 of the finest mosques, and killed 100 of the inhabitants. In antiquity Prusa was the capital of Bithynia, deriving its name from Prusias, one of the early Bithynian kings. Under the Romans it was the residence of Pliny the Younger and of other Roman governors. Wrested from the hands of the Greek emperors by Orkhan, the son of the founder of the Ottoman dynasty, it became the seat of the new empire, till Amurath I. removed the seat of government to



Brusa.

Constantinople. The tombs of the ancient sultans, the mosques, of which there were about 200, and other remarkable buildings, handsome bath-houses, a vast number of private and public buildings, fine gardens, extensive bazaars, and the superb view from Mount Olympus, all contributed to enhance the beauty of the town. But since the earthquake most of the public buildings have been in ruins.

BRUSASORCI (**DOMENICO RICCIO**), an Italian painter, born at Verona in 1494, died in 1567. He studied at Venice, and imitated Titian so successfully as to gain the name of "the Titian of Verona." He painted principally in fresco, and chose mythological subjects. At Verona he painted his celebrated "Coronation of Charles V." and the "Procession," in which appear the portraits of the emperor, Pope Clement VII., and other distinguished personages of the time. He also painted "Phaëton" in the ducal palace at Verona, and the "Martyrdom of St. Barbara."

BRUSH, a common name for a variety of implements, employed for removing dirt, for smoothing and polishing surfaces of objects by rubbing, and for laying on colors. They are usually made by inserting the bristles or hairs of animals in a firm support, which holds them in their proper arrangement, and at the same time serves as a handle. Most brushes are

manufactured of the bristles of the hog.—The first process of the brush manufacturer is to sort the bristles according to their colors, unless he obtains them thus assorted. The divisions are into black, gray, yellow, white, and lilies. The last are the purest white, and are preferred for tooth and shaving brushes. Each kind is then assorted according to size, which is done by passing a bunch of them, held in the hand, between a row of steel points, like the teeth of a comb, which catch the coarser bristles. By using a succession of these combs of increasing fineness, the bristles are separated into as many heaps as desirable. Care is taken to keep them always arranged uniformly. The cylindrical brush used by house painters is made by taking a bundle of bristles, and tying them firmly around their root ends. This bundle is then strongly bound between the prongs of a forked stick, and covered with a coating of glue and red lead. Another and more common method is to arrange the bristles around the small end of a conical stick, the small ends of the bristles pointing to the larger end of the stick. The bristles being secured by twine wrapping, and placed in a cup or socket with a hole in the bottom to let the handle pass through, this is driven home till the large end is buried in the centre of the bundle, tightening the fastenings, when the bristles are further

secured by saturating their ends with glue or pitch. Other brushes are made for the most part by inserting little tufts of bristles into holes bored in rows into a stock of wood, bone, or ivory. The bristles are in some kinds secured by dipping their root ends into hot pitch, winding a piece of string round these ends, then dipping them again, and quickly introducing them with a twisting motion into the holes, where the pitch soon sets, and holds them.—Many brushes, as hair brushes, and indeed most of those made with tufts which are not too large, are made by drawing the bristles, which are doubled in the middle, through holes and fastening them on the back with wire. The process of drawing and fastening the bristles is commonly performed by women. They sit around a table, each with a clamp attached to its edge for holding the stock-board, and each supplied with a fine flexible brass wire which is held in the right hand, and an apron full of bristles. A loop of the wire is passed through a hole in the stock, and a number of bristles being laid in it, the wire is pulled tight, causing the bristles to double and be drawn into the hole. The same process is repeated with the next hole, and so on, until all are filled with bristles, which are held tightly in their places by the wire. They are then clipped by a pair of shears gauged to cut the length of bristles required. If the bristles are very long, the clipping is done as each row of holes is drawn. Persons skilled in this process have drawn as many as 500 tufts in an hour; but 100 an hour is a more common rate. In brushes that are to be exposed to acid liquors, that would corrode brass wire, as the stopping brush used by hatmakers, a cord is substituted. The brush is finished by gluing a thin veneer upon the back of the stock, which covers over and protects the wire. A process for making hair brushes is employed by the Florence manufacturing company, by which much labor is saved. The brush, the stock of which is composed of what is known as hard rubber composition, is made in a die, and the operation, after the adjustment of the bristles, is performed in a few moments. The die is composed of two parts, the cover and the base. In the cover there is cut whatever device or ornament the back of the brush is intended to receive. In the base there are holes of a depth to correspond with the length of the tufts which are exposed after the brush is finished. The process commences by filling the holes with bristles, which have been cut by a gauge as much longer than the depth of the holes as it is desired to have them penetrate the back of the brush. The upper part of the die is then covered with a sufficient quantity of plastic rubber composition, when it is adjusted to its fellow and the die is placed in a screw press and subjected to great pressure. After hardening, which takes place in a few minutes, the brush is removed, perfectly finished, having the tufts firmly held.—An ingenious

machine for making flat brushes, the invention of Oscar D. and E. C. Woodbury of New York was patented in April, 1870. It folds the tufts of bristles at the middle, and secures the knuckle by a wire passed through and wound spirally round it. It is then forced with a twisting motion into the hole in the back prepared

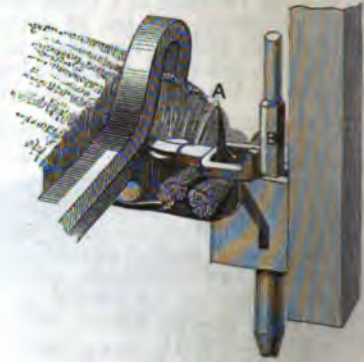


Fig. 1.

it, and firmly secured. The machine will fill from 60 to 80 holes per minute. The back of the brush is made of one piece of wood, and the holes may be bored into it (not through it) by a gang of bits. It is not necessary that the holes be bored at certain distances, or with great regularity, because by an ingenious arrangement the hole to be filled is brought immediately beneath the cone which delivers the tuft. The bristles are fed from a metallic cone in the manner shown in fig. 1, the tuft being separated at the point A. It is doubled by the plunger B, and forced down into the cone, as shown in fig. 2. The wire is passed through the bend and twisted around by the rotary motion of the plunger, which passes into a hollow cone, having a spiral groove which gives direction to the wire and secures it. The plunger continues to descend with a twisting motion until it reaches the back of the brush, and screws the tuft into it, as shown in fig. 3, where it rises and receives another tuft, which it manipulates as before.—The delicate brushes, called also hair pencils, used for water colors, are made of the hair of the camel, goat, badger, sable, squirrel, &c., by binding a bundle of them together after being carefully at-



Fig. 2.

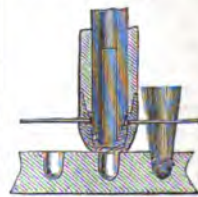
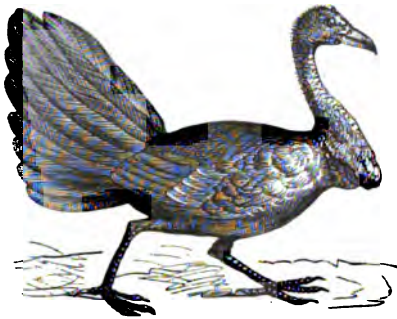


Fig. 3.

aged, and their points temporarily protected, sliding this through the larger end of a quill, the points project sufficiently far through the smaller end. The tube, having been previously softened by water, contracts as it dries, and holds the bundle of hairs fast. The best brushes of this kind are made of the hair taken from the tail of a species of Russian sable.

BRUSH TURKEY, a local name given by the colonists of Australia to a family of birds, the peculiar habits of which are in many respects among the most remarkable facts known in the history of the animal kingdom. The several varieties of this group are now assigned to the family of *megapodiidae*. There are but about 12 species in all known to belong to this



Brush Turkey (*Talegalla Lathamii*).

family. All of these are restricted in their range to the eastern archipelagoes of Asia, and Australia, especially to the latter. The *megapodiidae* are subdivided into the sub-families of *talegallinae* and *megapodiinae*. They are also known as New Holland vultures, native pheasants, and jungle fowl. To the most noticeable of this group, *talegalla Lathamii*, the name of brush turkey is chiefly applied—a name derived from the facility with which it eludes pursuit by running through tangled brushwood. Some disagreement has existed among systematists whether it should be classed among the true vultures, or among gallinaceous birds; but it is now by common consent placed among the *gallinae*. The most remarkable circumstance in the economy of this family is its method of hatching. Some weeks before the commencement of laying, several pairs of birds collect an almost incredible heap of decaying vegetable matter as a depository for their eggs, to be developed by the heat engendered in the process of decomposition. These heaps frequently contain four cart loads of materials, and are constructed in a perfectly conical form. If undisturbed, the same site is resorted to year after year, the birds adding each season a fresh supply just before the period of laying. The eggs are deposited about 12 inches apart, and all buried to the depth of two or more feet; they are uniformly placed with the larger end up, and carefully covered. The chick when produced is fully feathered, and able to provide for its own wants from the mo-

ment of leaving the shell. The number of eggs deposited in a single heap is often very great, as many as a bushel being frequently found. From experiments made in heaps collected by birds partially domesticated, the heat of their centre has been ascertained to range as high as 95° F.—The *leipoa ocellata*, another of this interesting group, deposits her eggs in mounds of sand alternating with layers of dried leaves and grasses. The *megapodius tumulus* constructs mounds of earth, said to be often of an immense size, varying from 20 ft. in circumference and 5 ft. in height to a diameter of 20 ft. and a height of 15 ft. In these the eggs are carefully covered up by the parent birds, and buried often to the depth of 6 ft. Other species merely deposit their eggs, in large numbers, in holes excavated on the seashore to the depth of 2 or 3 ft. Nearly all the family, however, are unequivocally mound-builders.

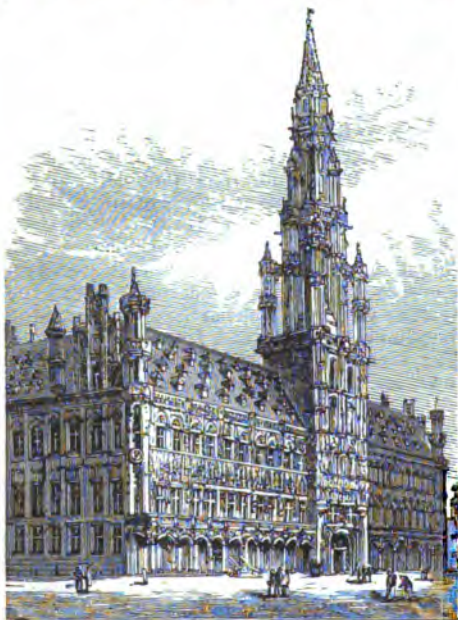
BRUSSELS (Flemish, *Brussel*; Fr. *Bruxelles*), the capital of Belgium, and of the province of South Brabant, situated on the river Senne, in lat. 50° 51' N., lon. 4° 21' E.; pop. in 1870, 171,277, or including the eight suburban communes, 314,077. In the new town, which is higher and healthier than the old, are the royal palaces and the mansions of the nobility, the park, public promenades (the *Allée verte* being the most popular), the chambers of the legislative bodies, and the libraries and museums occupying the former residence of the Austrian viceroys; while in the old town are the churches of the 14th and 15th centuries, with their superb oak carvings, stained glass windows and statues, the hôtel de ville, and the



Church of St. Gudule.

mansions of the former nobles and burghers of Brabant, now chiefly occupied by the middle class. The principal church is that of St. Gudule, an immense building in Gothic style,

with two very lofty towers. The choir and transepts, as at present existing, were finished in 1273, the nave in the 14th century; the exterior was restored in 1843. The windows are filled with the richest stained glass in the Netherlands, and the church contains many costly monuments of the dukes of Brabant, and statues of the twelve apostles; the pulpit is one of the finest specimens of Flemish oak carving. The hôtel de ville, in the Grande place, is a vast structure commenced in 1401; the tower, of Gothic open work, rises to the height of 364 ft., and is surmounted by a vane representing the figure of St. Michael, in gilded copper, 17 ft. high. The abdication of Charles V. took place in the old ducal palace, burnt down in 1733, which stood on the site of the place Royale, in which is an equestrian statue



Hôtel de Ville.

of Godfrey de Bouillon. The ancient square, on which is the hôtel de ville, is lined with picturesque old buildings, including the Broodhuis, where Counts Egmont and Horn passed the last night prior to their execution, and from a window of which Alva looked upon the bloody spectacle. On the site of the scaffold in this square colossal statues of Egmont and Horn were erected in 1864. The palace of the fine arts, formerly the residence of the Spanish and Austrian governors, contains a very large collection of paintings, a museum of natural history, the most complete in Belgium, a museum of models of machinery and inventions in the mechanic arts, and a library founded by the dukes of Burgundy in the 14th century, and enriched by successive sovereigns, which now contains 234,000 printed volumes and 20,000

MSS., many of the latter superbly illuminated. A museum of antiquities attached to the building contains numerous curiosities. The porte de Hal, which was originally one of the city gates and afterward Alva's bastille, now contains ancient armor, banners of the guilds, and other relics. The palace of the dukes d'Autriche contains exquisite pictures, a fine library, objects of *vertu*, and a head believed to be the original of the central figure in the group of the Laocoön. The palace of the prince of Orange, formerly considered the richest residence in Europe, has been dismantled, and its contents removed to the Hague. The *galerie St. Hubert* is a handsome arcade covered with glass, and filled with shops, extending from the vegetable market to the rue de l'Évêque, was completed in 1847. An observatory was built in 1831, and is one of the best in Europe. The university was founded in 1364. Other prominent establishments are the academy of sciences and art, the conservatory of music, the academy of painting, the school for sculpture and architecture, and the military school. The botanical society has a celebrated botanical garden. The most extensive of the charitable institutions is the hospital St. Pierre. Brussels is the seat of several important banking establishments, and in its exchange a large amount of speculative business is transacted. It is the centre of the Belgian lace trade. The principal manufactures are fine lace, leather and leather goods, linen and woollen goods, sewing machines, earthenware, chemicals, stationery, cigars, carriages, steam engines, musical instruments, hatters' furs, furniture, and boots and shoes. The book trade is very flourishing. Window glass and glass ware are extensively exported. The exports to the United States for the year ending Sept. 30, 1871, chiefly glass ware, laces, leather, gloves, wool and hatters' goods, and paper, amounted to \$4,725,787 06. French is the language of the elite society, but the mass of the people retain the use of the Flemish and Walloon languages. A complete system of railways connects Brussels with all parts of the kingdom, and with the rest of the continent. In the budget of 1871, the expenditures of the city were estimated at 19,000,000 francs.—The Frankings had a residence at Brussels as early as the 8th century. The city received its present name and was surrounded with walls in 1047, when it became the residence of the dukes of Brabant. It was the court residence in the Netherlands under Charles V., and the principal scene of the tyranny of Alva and thequisition under Philip II. It was bombarded by the French in 1695, when 4,000 buildings were destroyed. It was taken by Marshal Saxe in 1746, but two years later restored to Austria. In 1789-'90 it was distracted by the Brabant revolution, but the Austrian power was speedily reestablished. It again fell into the hands of the French in 1792. In 1815 it was made one of the two capitals of the Netherlands, at

After the revolution of 1830 the capital of Belium. In the place des Martyrs is a monument erected over the grave of about 800 victims of that revolution.

BRUTTIUM (in the classics *Brutthi*, the name of the inhabitants having been used for the country until more modern times; *Gr. Bruttia*), an ancient division of southern Italy, comprising almost the whole of the modern provinces of Calabria Citra and Calabria Ultra, occupying the peninsula forming the S. W. extremity of the country, and bounded N. by Lucania, E. and S. by the Sicilian sea, and W. by the Tyrrhenian sea. The Apennines occupy the entire centre of the peninsula and its N. W. portion, and exhibit here some remarkable features. The principal rivers were the Crathis (now Crati), which flowed northward from its source near Consentia (Cosenza) across the border of Lucania and into the Tarentine gulf near Sybaris; and the Neæthus (Neto), rising near the source of the Crathis and flowing eastward into the sea about midway between Crimisa and Crotona. The greater part of the surface is rugged and rocky. On the mountain sides the vine flourishes, and the land along the coasts has been always cultivated with success from very ancient times; but the timber of the mountain districts appears to have been almost the only natural product of the country which was of great importance to the ancient inhabitants.—The Bruttians, properly so called, did not become masters of the peninsula until about 356 B. C. In the earliest times it appears to have been inhabited by the Pelasgian race, the Ænотrians, two tribes of which bore the names of Chones and Morgetes. At a very early period, however, Greek colonists took possession of the coasts, and within a short time had surrounded the peninsula with a circle of important settlements, of which the chief were Crotona, Scyllacium, Locri, and Rhegium. Two or three of these had also dependencies of considerable wealth and prosperity. The Greeks appear to have completely subjected the native inhabitants, and to have held them almost in a state of slavery until after the Peloponnesian war. Shortly after the termination of this, the Lucanians began gradual encroachments on the peninsula from the north, and by the beginning of the 4th century B. C. they had conquered the greater part of the interior, changing the masters of the oppressed natives without bettering their condition. It was probably this long-continued slavery that led, about 356 B. C., to the uprising of the people properly called the Bruttians. The descriptions of ancient authors do not clearly show from what races these were made up; but there is little question that a large proportion of them were of the Ænотrian or native stock, and that there were many Lucanians also among them. The name is said to have been given them by the Lucanians, and to have signified rebels or revolted slaves. They rapidly gained inde-

pendence and power, took several of the Greek cities, and finally united with the Lucanian armies against the Grecian power. They were successful in maintaining and increasing their strength in the peninsula until they joined with the Samnites and again with the Lucanians against Rome, in 282 B. C. For several years they continued the war, but were finally subdued by C. Fabricius and L. Papirius, and obliged to give up a valuable portion of their territory, besides becoming subject to the Roman power. During the second Punic war they revolted, and rendered most important assistance to Hannibal; but they were again subdued, and severely punished by the Romans, the chief part of their territory being taken from them, and their people being reduced almost to slavery. They do not again appear in history as a nation, and their country is treated from this time as a Roman province. (See CALABRIA.)

BRUTUS, Decimus Junius, a Roman soldier, executed in 43 B. C. He served under Cæsar in the Gallic war, and in the civil war commanded the fleet which besieged Massilia. Cæsar afterward appointed him to the government of Further Gaul, and showed him special favors. Nevertheless he joined the conspiracy against Cæsar, and on the ides of March conducted him to the senate house. After the assassination he retired to Cisalpine Gaul, and there maintained himself for some time, standing a siege in Mutina (Modena) against Antony, which early in 43 was raised by the consuls Hirtius and Pansa, and Octavius. But when Octavius had made common cause and combined operations with Antony, Brutus was deserted by his troops, betrayed to Antony, and put to death.

BRUTUS, Lucius Junius, a Roman patriot, lived about 500 B. C. According to the commonly received story, his mother was the sister of Tarquin the Proud, the last king of Rome, and he feigned imbecility to escape the harsh treatment which his father and brothers had received. He accompanied Tarquin's sons on a mission to Delphi, and when the oracle declared that the one who first kissed his mother should rule in Rome after Tarquin, he, on landing in Italy, affected to stumble and kissed the ground, the common mother of all. After the rape of Lucretia he threw off the pretence of imbecility, plucked the dagger from the dying woman's breast, incited her kinsmen to revenge, and led an insurrection which drove the king from the city and put an end to the monarchy. He and Collatinus, the husband of Lucretia, were chosen consuls. His two sons, Titus and Tiberius, taking part in a conspiracy for the restoration of the kings, were tried before him, and he condemned them to be scourged and beheaded, and saw the sentence carried into effect. The adherents of Tarquin came against Rome with a force of Etruscans, and in repelling the attack Brutus was killed by Aruns, son of Tarquin. A public

funeral was decreed, the women wore mourning for a year, and according to Plutarch a brazen statue with a drawn sword in the hand was raised to his memory. The inconsistencies and improbabilities of the story as related by Livy have been pointed out by Niebuhr.

BRUTUS, Marcus Junius, one of the assassins of Cæsar, born in 85 B. C., died in 42. His father, Marcus Junius Brutus, having been put to death by order of Pompey, he was adopted by his maternal uncle Quintus Servilius Cæpio, and carefully educated. He married a daughter of Appius Claudius, and was for some time with his father-in-law in Cilicia, where he made a fortune by loaning money at usury. In the civil war he joined Pompey, but was treated with great consideration by Cæsar after the battle of Pharsalia and made governor of Cisalpine Gaul. After his return to Rome he was divorced from Claudia, in order that he might marry Portia, daughter of Cato. In 44 B. C. he was persuaded by Caius Cassius to join in the conspiracy against Cæsar, and took part in his assassination, although the dictator had made him prætor of the city, and promised him the province of Macedonia and the consulship. Finding that he could not appease the people, he fled to Athens and afterward to Macedonia and Asia Minor, where he assumed the title of imperator, and gathered forces to oppose the triumvirate. With Cassius he met Antony and Octavius at Philippi, and being ultimately defeated in battle threw himself on his sword and died. Cassius had shortly before put an end to his life, and Portia too, on hearing the news, voluntarily terminated hers. Brutus was a zealous student, and stood well among the literary men of his day, though none of his orations and philosophical treatises and few of his letters have been preserved.

BRUYAS, Jacques, a French Jesuit missionary, born in 1637, died at Sault St. Louis, Canada, June 15, 1712. He arrived in Canada in August, 1666, and was almost immediately employed in the Iroquois missions, which he contributed more perhaps than any other to found. He studied the Mohawk language thoroughly, and wrote several works on it. His *Radices Verborum Iroquoiorum*, or "Radical Words of the Mohawk Language," was published at New York in 1862.

BRUX, a town of Bohemia, capital of a district of the same name, on the Bila, 45 m. N. W. of Prague; pop. in 1869, 6,308. The town has a gymnasium which is conducted by the Piarists, a military educational institution, and many manufactories. In 1421 a battle took place here between the Saxons and the Hussites.

BRUYÈRE, Jean de la. See **LA BRUYÈRE**.

BRUYN, Cornelis de, a Dutch traveller and painter, born at the Hague in 1652, died in Utrecht at an advanced age. He visited Rome in 1674, and for several years devoted himself to painting in different cities of Italy. After travelling through Asia Minor, Egypt, and the Ægean isles, he again resumed the practice of

his art at Venice, and after his return to Holland published his "Travels in the Levant" with 200 illustrations (Delft, 1698). From 1701 to 1708 he was travelling in Russia, Persia, India and the islands of the Indian ocean, and on his return published a narrative of the journey embellished with 300 engravings.

BRUYS, or Bruls, Peter de, a priest of southern France, the founder of a sect called from him the Petrobrussians, burnt at St. Gilles (according to Neander) in 1120. He is supposed to have been a pupil of Abélard; but nothing is known of his life prior to the time when he began his vehement opposition to the church. His chief aim was to restore the Christian religion to its earliest simplicity, and to free its observances from all symbolism. He denied the authority of an established hierarchy and the necessity of priestly ministration; opposed the baptism of infants; held that the communion was not a sacrament, and was unnecessary; and that churches or places of worship were useless, since prayer could be offered everywhere. He rejected the doctrines of the celibacy of the clergy, of the value of masses and prayers for the dead, and of purgatory. He gained a considerable body of followers in southern France, who partook of his own fanaticism, and whom he did not restrain from violence; they destroyed images in the churches, burned the crosses, and ill-treated priests and worshippers. In spite of the boldness of the acts, his preaching is said to have continued twenty years; but he was at last seized at St. Gilles and condemned to the stake. His followers long maintained his doctrines in southern France and Switzerland, under the leadership of Henry of Lausanne, from whom the sect derived their later name of Henricians.

BEY, Theodorie, or Dirk, an engraver and print and book publisher, born at Liège in 1528, died at Frankfort-on-the-Main in 1599. He appears to have received his first instruction in engraving in his native city, where he also first established himself in business; but about 1570 he changed his residence to Frankfort, and there largely increased his publishing establishment. Assisted by his son John Theodore and John Israel, both of whom were instructed by their father, had gained reputations nearly equal to his own, he prepared the plates for many of his own publications, as well as for others appearing in different parts of Germany and even in London. Among his best known works are the plates to "The brief, true Report of the New-found Land of Virginia," by Thomas Hariot, "sergeant to Sir Walter Raleigh" (Frankfort, 1596); twelve plates illustrating the procession of knights of the garter; a design for a saucer, representing Pride and Folly; and similar designs for dishes.

BRYAN, an E. county of Georgia, bordering on the Atlantic; area, 472 sq. m.; pop. in 1870, 5,252, of whom 3,605 were colored. The Ogeechee river touches its N. E. boundary, and the Cannouchee flows through it from W. to E.

the soil is sandy. The surface on the banks of the river is undulating, and in other parts generally level. Much of the land is covered by pine forests. The Atlantic and Gulf railroad passes through the county. In 1870 the principal productions were 38,909 bushels of Indian corn, 28,560 of oats, 30,834 of sweet potatoes, 412 bales of cotton, and 2,857,068 lbs. of rice. There were 527 horses, 1,221 milch cows, 3,483 other cattle, 1,934 sheep, and 5,631 swine. Capital, Eden.

BRYAN, or Bryant, Sir Francis, an English soldier and poet, died in 1550. In 1522 he served with credit in France, under the earl of Surrey; in 1528 was ambassador to France; and in 1529 was sent to Rome to settle the matter of the divorce of Henry VIII. Under Edward VI. he marched against the Scots, and in the battle of Musselburgh commanded the light-horse. In 1548 he was appointed governor of Ireland, where he married the countess of Ormond. Some of his songs and sonnets were printed with those of Surrey and Wyatt.

BRYAN, Michael, an English connoisseur in art, born at Newcastle in 1757, died in London, March 21, 1821. From 1781 to 1790 he travelled in Flanders, engaged in art studies; and here formed the acquaintance of the earl of Pembroke, whose sister he afterward married. In 1794 he was employed by the duke of Bridgewater, the marquis of Stafford, and the earl of Carlisle to purchase the celebrated Orleans gallery of paintings. This negotiation was conducted with such ability as to gain universal approval. From this time he exercised the greatest influence in England as an art critic, and was looked upon as one of the first connoisseurs of the day. In 1816 he published his "Dictionary of Painters and Engravers," which has become a standard work. An edition of this, edited and enlarged by George Stanley, appeared in 1858.

BRYANT, Jacob, an English writer, born at Plymouth in 1715, died at Cypenham, near Windsor, Nov. 14, 1804. He graduated at Cambridge in 1740, and was tutor to the marquis of Blandford, subsequently duke of Marlborough. In 1756 he became the duke's secretary, and accompanied him during his command in Germany. After his return he received a lucrative appointment in the ordnance, and resumed the mastership of the Charterhouse. He published in 1767 "Observations and Inquiries relating to various parts of Ancient History," wherein he discusses the most abstruse and curious questions. In 1774 appeared the first two volumes, followed in 1776 by a third, of his most elaborate work, "A New System or Analysis of Ancient Mythology, wherein an attempt is made to divest Tradition of Fable and to restore Truth to its Original Purity." In order to "divest tradition of fable," he called to his aid etymological deductions, endeavoring to glean historical facts from the affinities of language. In 1775 he published "A Vindication of the Apamean Medals." In 1780

appeared his *Vindicia Flavianæ*, vindicating the testimony of Josephus concerning Christ. In the same year he entered upon a discussion with Priestley on the question of philosophical necessity; and in 1781 he published two volumes in which he endeavored to prove the authenticity of the Rowley poems of Chatterton. In 1796 he published a "Dissertation concerning the War of Troy," maintaining that no such war ever took place, and no such city ever existed. His last literary labor was preparing for the press a volume of "Dissertations on various Subjects in the Old Testament."

BRYANT, William Cullen, an American poet, born at Cummington, Hampshire co., Mass., Nov. 3, 1794. His father, Peter Bryant, was a distinguished local physician, who had also travelled considerably, and devoted much time to the culture of his mind. He took unusual interest in the intellectual and moral development of his children, and was rewarded in the case of all of them, and particularly in that of William, with early evidence of their proficiency. The poet, in his beautiful "Hymn to Death," alludes feelingly to him in the lines beginning:

For he is in his grave, who taught my youth
The art of verse, and in the bud of life
Offered me to the muses;

which was no poetic exaggeration, but a literal truth. There are few instances of precocity more remarkable than that of Bryant. He communicated lines to the county gazette before he was ten years of age, and in his 14th year his friends caused to be printed two considerable poems, "The Embargo," a political satire, and "The Spanish Revolution." These passed to a second edition the next year (1809), and in the preface to that edition it was found necessary to certify the production of them by a person so young, in order to remove the skepticism of the public. In his 19th year he wrote "Thanatopsis," which still holds its place in general estimation as one of the most impressive poems in the language. He had in 1810 entered Williams college, where he was soon distinguished for his attainments in language and in polite literature. At the end of two years he took an honorable dismission, and engaged in the study of the law. Admitted to the bar in 1815, he commenced practice in Plainfield, and afterward removed to Great Barrington. He speedily rose to a high rank in the local and state courts; but his tastes inclined him rather to letters than to law. In 1817 his poem "Thanatopsis" was published in the "North American Review," and introduced him to the acquaintance of Mr. Richard H. Dana, who was one of the club which then conducted the "Review." He contributed also several prose articles to that periodical. In 1821 he delivered before the Phi Beta Kappa society at Harvard college a didactic poem on "The Ages;" and in that year several of his poems were collected in a volume at Cambridge, and obtained for him immediate recognition as a writer of high merit. He removed

to New York in 1825, and was engaged as an editor of the "New York Review," soon after merged in the "United States Review," to which he contributed several criticisms and poems. In 1826 he connected himself with the "Evening Post" newspaper, under the editorial control of William Coleman. At that time it was inclined to federalism, and Mr. Bryant sought to give it more and more a republican character. When he acquired an exclusive control of its columns, a few years later, he rendered it decidedly "democratic," taking ground in favor of freedom of trade and against all partial or class legislation. From 1827 to 1830 Mr. Bryant was associated with Robert C. Sands and Gulian C. Verplanck in the editorship of the "Talisman," a highly successful annual; and he contributed about the same time the tales of "Medfield" and "The Skeleton's Cave" to a book entitled "Tales of the Glauber Spa." In 1832 a complete edition of his poems was published in New York, and a copy of it reaching Washington Irving in England, he caused an edition to be printed there, with a laudatory preface. It was most generously reviewed by John Wilson in "Blackwood's Magazine," and from that time Mr. Bryant's reputation in Europe has stood as high as it does in his own country. Having associated William Leggett with himself in the management of the "Evening Post," he sailed with his family to Europe in the spring of 1834, and travelled through France, Italy, and Germany, enlarging his knowledge of the languages and literatures of the leading nations. His poems bear witness to his familiarity with the Spanish, Italian, German, and French languages, which he has continued to cultivate. After returning to his native country, and resuming his professional labors for some years, he went again to Europe in 1845. In 1849 he made a third visit, and extended his journey into Egypt and Syria. The letters written to his journal during these wanderings were published in a book called "Letters of a Traveller," soon after his last return. But in the intervals of these foreign journeys he had by no means neglected his own country, and the same volume contains evidences of his sojourn in nearly all parts of the United States, from Maine to Florida, and of a trip also to the island of Cuba. About 1845 he purchased "an old-time mansion," embowered in vines and flowers, near the village of Roslyn, on Long Island, where he has since resided. In 1857 and 1858 he made another journey to Europe, writing letters to the "Evening Post," which were collected under the title of "Letters from Spain and other Countries." A new and complete edition of his poems was published in 1855, and in 1863 a small volume of new poems appeared under the title of "Thirty Poems." In 1864, on the completion of his 70th year, his birthday was celebrated by a festival at the Century club, nearly all the prominent literary men of the country being present, or sending

complimentary letters, which, with the proceedings, were subsequently published in a volume. He was for several years engaged on a translation of Homer into English blank verse. The "Iliad" appeared in 1870, and the "Odyssey" in 1871, and both were almost universally commended as the best English versions of the great epics. Mr. Bryant has been frequently called upon to pay public tributes to the memory of eminent Americans. On the death of the artist Thomas Cole, in 1848, he pronounced a funeral oration; in 1852 he delivered a discourse on the life and writings of James Fenimore Cooper; and in 1860 he paid a similar tribute to his friend Washington Irving; he made an address on the life and achievements of S. F. B. Morse, on the occasion of the dedication of his statue in Central park, New York, in 1871, and addresses on Shakespeare and Scott on similar occasions in 1872. He is still engaged in the management of his newspaper. Of Bryant's various writings in prose, it has been said that they contain "no superfluous word, no empty or showy phrase," but are marked throughout by "pure, manly, straightforward, and vigorous English." His poems are characterized by extreme purity and elegance in the choice of words, a compact and vigorous diction, great delicacy of fancy and elevation of thought, and a genial yet solemn and religious philosophy. As a minute observer of nature, he is almost without a rival among poets.

BRYDGES, Sir Samuel Egerton, an English author, born at Wootton Court, Kent, Nov. 30, 1762, died in Geneva, Sept. 8, 1837. He was educated at Cambridge, and studied law, but never practised. After the death of the last duke of Chandos, in 1790, he induced his elder brother, the Rev. E. T. Brydges, to prefer a claim to the ancient barony of Chandos as a descendant from Anthony Brydges, third son of the first Lord Chandos. In 1803 the house of lords decided against the validity of this claim, but after the death of his brother Mr. Egerton Brydges insisted that he could assert his right at common law, and usually added to his signature the words "Per legem terræ Chandos of Sudeley." After several unsuccessful attempts to obtain a seat in parliament, he was elected for the borough of Maidstone, for which he sat from 1812 to 1818. In parliament he exerted himself mainly to effect changes in the poor law and the copyright act. He was created a baronet in 1814. Having lost his seat in parliament, he resided chiefly on the continent, at last taking up his residence at Geneva, where he lived in great seclusion. The failure of his attempt to obtain a seat in the house of peers, and pecuniary embarrassments growing out of extravagance on his Kentish estates, threw a gloom over his life, and affected the tone of his writings. His literary labors included romance, poetry, criticism, politics, biography, genealogy, topography, and classical literature. Shortly before his death he stated that he had written more than 14,000 sonnets. He edited

poetical works of Milton, and his abilities as a genealogist, topographer, and bibliographer are attested by his *Censura Literaria* (10 vols.), *Restituta* (4 vols.), *Theatrum Poetarum*, *emmata Illustria, Lex Terra*, and "British bibliography." He also edited a "British survey," full of varied information. His *Autobiography*, *Times*, and *Opinions* was published in 2 vols. in 1834.

BRYDONE, Patrick, a Scottish traveller, born at Dumbarton in 1741, died near Coldstream, June 19, 1818. As a travelling tutor he visited France and Italy in 1767-'8, and Sicily and Malta in 1770. In 1773 he published his "Tour through Sicily and Malta," which obtained extraordinary popularity. He was afterward appointed comptroller of the stamp office. He made curious observations on the condition of the atmosphere, giving special attention to electrical phenomena, and contributed papers on electricity to the "Philosophical Transactions."

BRYONIA, or *Bryonia*, a poisonous extract of bitter taste, prepared from the roots of the *bryonia alba* and *dioica*, by the process for ether extracts. It is of a yellowish brown



Bryony (*Bryonia dioica*).

color, soluble in water and alcohol, but not in ether. The plant bryony (Gr. *βρύων*, to grow rapidly) is a wild creeper, with twisting tendrils and scarlet berries of a disagreeable odor. It is met with in different parts of Europe, where it is employed as a purgative medicine, and its berries in dyeing. Its root, when bruised and applied to the skin, is so highly irritant as to produce blisters. Over-doses of the extract have proved fatal.

BRYOZOA, or *Moss Animals*, a name proposed by Ehrenberg for so-called zoöphytes having separate openings for the mouth and anus; they had previously been called polyzoa by Thompson. (See POLYZOA.) They have also been called molluscan zoöphytes, ascidioid and radiated polyps, ciliobranchiata, and anthoid mollusks. By modern systematists they have

been generally regarded as an order of acephalous mollusks. They are of small size, growing in clusters and in delicate and beautiful ramifications on stones, shells, algae, and other submarine bodies; a few live only in fresh water. Though polyp-like in appearance, and some resembling corals in their moss-like aggregated cells, they present no radiated structure; the cells are either branched, reticulated, or incrusting; they are found from the Silurian period to the present. *Eschara*, *Austra*, and *retepora* are characteristic genera. Prof. Morse has shown that the young brachiopod resembles the polyzoön in its ciliated appendages; and believes that both belong to the annelidan type of articulates, as Leuckart and Gegenbaur maintain, though having certain affinities to the mollusks, as Allmann has pointed out.

BRZESC LITEWSKI. See BREST LITOVSKI.

BRZEZAN (Pol. *Brzezany*), a town of Galicia, Austria, 51 m. S. E. of Lemberg; pop. in 1869, 9,290. It has a gymnasium, a convent of the Bernardines, an old castle, which was formerly fortified and has interesting subterranean vaults, a hospital, a poorhouse, and extensive leather manufactories.

BUA, a small island in the Adriatic, belonging to Austria, in the district of Spalato; area, 11 sq. m.; pop. about 4,000. It is connected with the town of Trau by a bridge. It produces dates, wines, and olives, and has a remarkable well of asphaltum. It contains six villages, the principal of which is Santa Croce, or Bua. During the later period of the Roman empire many political prisoners and heretics were confined in the island.

BUACHE. I. **Philippe**, a French geographer, born in Paris, Feb. 7, 1700, died Jan. 27, 1773. In 1729 he became chief geographer to the king, and in the following year a member of the academy of sciences, in which he had been the means of instituting a professorship of geography. He contributed many important papers to the *Mémoires* of the academy. He had some peculiar ideas on the subject of geography, affirming that there was a vast continent about the south pole, traversed by lofty mountains and gigantic rivers. The suggestion that at Behring strait a connection between Asia and America might be traced came from him. II. **Jean Nicolas Buache de la Neuville**, a French geographer, nephew of the preceding, born at Neuville-en-Pont, Feb. 15, 1741, died Nov. 21, 1825. He instructed the royal princes, afterward Louis XVI. and XVIII., and Charles X., in geography. After the death of D'Anville he became first geographer to the king, and keeper of the marine charts and log-books, in which capacity he prepared the charts and plans with which La Pérouse was provided for his voyage of discovery. During the reign of terror he was deprived of his office, but was reinstated after the fall of Robespierre. He was the author of many geographical memoirs and treatises.

BUAGE, a plant discovered in the Zambesi region by Dr. Livingstone. The genus is unknown, but the excellent fibre, much resembling flax, found in the stem, renders this plant



Buage.

of great importance to the natives. It has not been cultivated, but grows wild in great abundance. The leaves are narrow, alternate, and of a thick texture; the flower is unknown.

BUANSUAH, a wild dog of northern India, generally believed to be one of the races from which the domestic dog has been derived. Like other wild *canidae*, it is shy, and fond of living in thick woods, whence it issues in packs to hunt its game. The voice is peculiar, intermediate between a bark and a howl, and is uttered as it runs. A pack will consist of about a dozen individuals, and they do not



Buansuah.

hesitate to attack and worry to death even the tiger; they hunt more by the scent than by sight. When taken young the buansuah is readily tamed, and may be trained to the chase, though it has not the persistence of the domestic dog.

BUBASTIS, or **Bubastus**, a city of ancient Egypt, capital of the nome Bubastitis in the delta of the Nile, situated on the E. side of the

Pelusiatic branch, S. W. of Tanis. It is mentioned in the Old Testament as *Phi-Besith*, and its site is now called *Tel-Bustak*. It was built in honor of the goddess *Pasht*, called by the Greeks *Bubastis*. This goddess was sometimes represented with the head of a cat, and many mummied cats have been found in the tombs of *Bubastis*. On other monuments she is depicted with the head of a lioness. The Greeks identified her with *Artemis* (*Diana*), but it appears that she was the goddess of fire, "the well-beloved of *Phtah*," to whom were ascribed the creation of the Asiatic race and the avenging of crimes. Her great temple in the city was considered by *Herodotus* the pleasantest to behold in all Egypt. On the N. side of the city commenced the canal between the Nile and the Red sea, constructed by *Pharaoh Necho*. *Bubastis* was taken by the Persians in 352 B. C., and its walls were dismantled. Among its ruins have been found remains of costly and magnificent temples. Here were celebrated solemn feasts to the goddess *Pasht*, attended by people from all parts of Egypt, even to the number of 700,000 at one time, as is stated by *Herodotus*, who gives (ii. 59, 60) a detailed account of the city.



Bubastis (Pasht).

BUBONA, in Roman mythology, the goddess who presided over cows and oxen. Small statues of this goddess were placed in the niches of stables, and her likeness was often painted over the manger.

BUCCANEERS (Fr. *boucanier*, one who dries the flesh of animals), a name applied to bands of French and English marine freebooters in the West Indies, who in the 17th century committed extensive depredations on commerce, and even extended their ravages to the mainland of Spanish America. The original buccaneers were those settlers, chiefly French, who attempted to introduce themselves into the Antilles not long after their first conquest by the Spaniards, who wished to monopolize their possession. Being driven out of *St. Christopher*, they took refuge in *Hispaniola*, a large part of which swarmed with droves of wild cattle. These they hunted, selling the hides to Dutch traders. The Spaniards looked with jealous eyes upon these new settlements; they lost no opportunity of harassing and destroying the buccaneers, and at length forced them for self-preservation to adopt other pursuits than hunting; some became planters, but the greater part, organizing in bands, began to return the injuries they had sustained. They were bound by oath to render all assist-

to each other, and to wreak the utmost vengeance on their foes, especially the Spaniards. If one of them was killed by the enemy, it was to be signally avenged; those who were killed in battle were compensated for their wounds according to their severity, while those considered helpless for life were provided for by the whole body. Plunder from the enemy was shared, but stealing from a fellow buccaneer was summarily punished. The stronghold of the buccaneers was formed about 1630 on the little island of Tortugas, where after driving out the Spaniards they erected fortifications. They went forth in bands of 50 to 100 at first only in open row boats, attacking and boarding vessels with desperate ferocity. These boats, frequently so small that the crews had no room to lie down, were directed bows on to an enemy, while their marksmen would take aim at the ports of a vessel and pick off the gunners; as soon as they came near enough they threw out grappling irons, and closing with the foe poured upon her decks. They lay in wait for vessels passing from America to Europe; those coming from Europe they seldom molested, as they carried cargoes which they could not readily sell, but the return voyages they were sure to find precious freights. The Spanish galleons in particular attracted their attention, as sometimes the booty seized in them was enormous. Though the richly laden vessels usually sailed under the pretence of protection, the buccaneers followed them as they emerged from the gulf of Bahama, and if one by accident became separated from the others, her doom was sealed. If her stores were such as to satisfy the rapacity of the pirates, she was permitted to proceed after being plundered; otherwise she was scuttled and the crew thrown overboard. The French buccaneers established themselves in Santo Domingo, and the English in Jamaica. Spanish commerce visibly declined, and Spanish ships scarcely dared to venture to America. Alarm for their own gains, the buccaneers changed their tactics, and from pillaging vessels attacked fortified towns. Many desperate characters made themselves conspicuous in these enterprises. One was a Frenchman named Montigny, who had contracted a deadly hate of the Spaniards by reading an account of their American conquests, and determined to join the buccaneers for the purpose of executing his schemes of vengeance. On his passage to the West Indies he fell in with a Spanish ship, which he at once boarded and the crew put to the sword. On arriving at the coast of Santo Domingo he offered his services to the buccaneers, and on the same day, falling in with a party of Spaniards, he attacked them with fury, and scarcely left one alive. He displayed the same spirit afterward on every occasion, and earned the title of the exterminator. The Spaniards now resolved to confine themselves within their settlements. This determination only stimulated the buccaneers to greater ef-

forts, in which they were much aided by François L'Olonnais, who had raised himself to be master of two boats and 22 men, with which he took a Spanish frigate on the coast of Cuba, and afterward at Port-au-Prince four more vessels, despatched to seize him. He then sailed for Tortugas, and there meeting with Miguel de Vasco, who had signalized himself by taking a Spanish galleon loaded with treasure under the very guns of Portobello, the two sailed in 1666 with 450 men to the bay of Venezuela, took a fort at its entrance, spiked the guns, and murdered the garrison, 250 in number. They then proceeded to Maracaibo, on the lake, and compelled it to capitulate. Disappointed in not finding treasure at Gibraltar, another town on the same shore, they fired it. An immense ransom was paid for Maracaibo, and the buccaneers carried off also the church bells, crosses, and pictures, intending to build a chapel at Tortugas.—The most noted of all these freebooters, and the one whose name is now most readily remembered, was Henry Morgan, a Welshman. While L'Olonnais and De Vasco were wasting their gains from Venezuela, he sailed from Jamaica in December, 1670, surprised and took Portobello, and then directed his operations against Panama. He at first went to the island of St. Catharine to procure guides, and here the governor of a strong fortress, who might have beaten him off, concerted with him to surrender on easy terms. After keeping up for some time the farce of a cannonade, the buccaneers entered the place, demolished the fortifications, and carried off an immense quantity of ammunition. They then steered toward the Chagres river and took a fort at its entrance, after a gallant resistance from its commander, who was killed. Leaving some of his vessels, Morgan sailed with sloops up the river 33 miles to Cruces, and thence proceeded by land to Panama. He defeated some troops sent out to meet him, and then entered the city, where he found a prodigious booty, with which the buccaneers departed, after firing the place and carrying off a large number of prisoners.—In 1688 an expedition was planned by Van Horn, a native of Ostend, who had long served among the French. He owned a frigate, and joining a number of others, with six vessels and 1,200 men, he sailed for Vera Cruz, landed under cover of darkness, surprised the fort and barracks, and surrounded the churches whither the citizens had fled for safety. The buccaneers then pillaged the city, and proposed to the citizens to ransom their lives for about \$2,000,000. This proposal was accepted, and half of the money paid down forthwith, when the buccaneers became alarmed at the approach of troops as well as a fleet of 17 Spanish vessels, and made off, carrying with them 1,500 slaves, and sailing through the enemy's line unmolested. About a year later the buccaneers undertook to plunder Peru. Upward of 4,000 men joined in this movement, some sailing by way of the straits of Magellan,

and others crossing the isthmus. Many cities along the coast were pillaged, and the inhabitants massacred; silver was so common that the buccaneers would not receive it in ransom, and would accept nothing but gold, pearls, or jewels.—While these events took place in the southern seas, an adventurer of the name of Grammont, a man of good birth and education, and distinguished as a soldier, made a demonstration in 1685 against Campeachy. He defeated 800 Spaniards outside of the town, and the combatants all entered the place together. The buccaneers then turned the guns of the city against the citadel; but as these did little harm, they were preparing some plan to surprise it when news was brought that it had been abandoned. Only one man remained faithful to his duty, refusing to quit his post, and Grammont was so pleased with his fidelity that he secured to him all his effects, besides rewarding him handsomely. After this the marauders spent upward of two months at Campeachy, and rifled the country of everything valuable for 15 leagues around. When their treasures were embarked they proposed that the governor, who was still in the field with 900 men, should ransom the city. On his refusing to do so, they burnt it to the ground, and then retired to Santo Domingo.—In 1697 a squadron of seven ships, under the command of a buccaneer named Pointis, with 1,200 men, sailed from Europe to attack Cartagena. This was the greatest enterprise that the buccaneers ever attempted. The city was taken, and the booty amounted to nearly \$8,000,000. The commander managed to secure for himself nearly all of this immense sum, and the buccaneers, exasperated with this treatment, returned to Cartagena, and there again secured enough to repay them for their losses; but on sailing for Europe they were attacked by a fleet of Dutch and English ships, in alliance with Spain, and most of their vessels captured or sunk. This was the last considerable exploit of the buccaneers. As the leaders dropped off one by one, none were found to supply their places, so that by degrees the organization fell to pieces; and moreover, many of them were induced to accept civil and military appointments to draw them from the piracy which governments had been unable to suppress.—See "The History of the Bucaniers, made English from the Dutch, written by John Esquemeling" (4to, London, 1684; reprinted in Walker's "British Classics," 12mo, 1810), a French version of which appeared in 1686 under the name of Alexandre Olivier Exmelin (*Histoire des aventuriers flibustiers*, Paris; new ed., 4 vols. 12mo, Trévoux, 1775). The author was himself one of the pirates.

BUCCINIDÆ (Lat. *buccinum*, a trumpet), a family of carnivorous gasteropod mollusks, many species of which are shaped like a trumpet, and when blown into emitting a sound like that of this instrument. The shell is either notched in front, or with the canal abruptly

turned back producing a ridge on the front of the shell. The name is derived from the *buccinum*. (See *WHELK*.) Other characteristic genera are the harp, helmet, olive, purple, and tun shells. Many are large and handsome, and prized as parlor ornaments; they are also useful as food and in the arts.

BUCENTAUR (Ital. *il Bucentoro*, of uncertain etymology), the state galley in which the Venetian doge annually, on Ascension day, weds the Adriatic. It was 100 ft. long, 21 ft. in extreme breadth, gorgeously gilded and adorned, and was manned by 168 rowers, four to an oar, and 40 sailors. The custom dates from the victory of the doge Sebastiano Ziani over the emperor Frederick Barbarossa in 1177, when Pope Alexander III. received the conqueror on the Lido and gave him a gold ring and authority to espouse the Adriatic to Venice. Every year afterward the doge in the galley, accompanied by numerous feluccas



The Bucentaur.

gondolas, and saluted by artillery, went to the mouth of the Lido and dropped a ring into the Adriatic with the words: *Desponsamus mare, in signum veri perpetuæ dominiæ*. When the French took Venice in 1797, the Bucentaur was burned and the custom of espousal was discontinued. A model of the original Bucentaur, made from drawings, is in the arsenal at Venice; but the galley of the time, with its carvings of cornucopias, medallions, marine deities, allegorical groups, though always claimed to be the self-same vessel, was so frequently repaired, remodeled, and replaced in parts, that very little of the original structure remained.

BUCEPHALUS (Gr. *βουκεφαλός*, ox-headed), the charger of Alexander the Great. His color was white, and he was called Bucephalus because he had a black mark resembling an ox-head on his forehead. The story is, that the Thessalian offered the horse for sale to Philip, but as none of his attendants or courtiers could manage him, the king ordered his own to take him away; whereon Alexander expressed regret at losing so fine an animal. Philip replied that he would buy the horse if his son could ride him. Alexander accepted the offer and succeeded in the attempt. The horse

never suffer any person to mount him Alexander.

BUKER, Martin, a German reformer, born at Ettstatt, in Alsace, in 1491, died in Cambridge, England, Feb. 27, 1551. His real name, according to some, was Butzer, but according to others it was Kuhhorn (Cowhorn), which, in the fashion among the learned of the time, was changed to a Greek analogue (*βοῦς*, ox, and *κων*, horn). Sent at the age of seven years to a Dominican convent, he gave offence by the independence of his sentiments, and was obliged to seek an asylum in the house of a friend. Thenceforward removed to Strasburg, he became acquainted with the writings of Melancthon and Luther. After conferences with the latter he espoused the principles of the reformation, and was married. In 1523 he became pastor in Strasburg, and was for 20 years one of the chief leaders of the reformation. He was inclined to favor the sentiments of Zwingli rather than those of Luther, though he was always a mediator between them. To the conference of Smalcald Bucer had brought a confession of his own in history as the confession of the four cities, from Constance, Memmingen, Strasburg, and Lindau, which did not agree with the language of the memorable 15th article of the Strasburg confession. Bucer introduced into this confession an acknowledgment of a "presence of Christ for the hand and mouth," and the four cities were saved to the league of Smalcald. In 1548 he was summoned to Augsburg to sign the *Interim*, an act by which Charles V. sought to make a temporary peace between the Catholics and Protestants until he could call a general council. Bucer refused to sign this document, and rendered himself obnoxious to Charles. On the invitation of Emperor he went in 1549 to England, where he was immediately appointed professor of theology at Cambridge. He lived only two years after his removal. After he had been dead 10 years his body was dug up in the reign of Elizabeth, and chained upright to a stake, in company with that of Fagius (who had left Germany at the same time and for the same reasons), and burned, and his tomb was demolished. Under Elizabeth the tombs of Bucer and Fagius were rebuilt. Bucer's writings are numerous, both in Latin and German. A complete edition of them, to appear in 10 volumes, was projected at Basel in 1577, but only one volume was published.

BUCH, Leopold von, a German geologist, born at Leipzig, April 25, 1774, died in Berlin, March 4, 1858. At the age of 16 he was placed at the Mining academy of Freiberg, where Alexander von Humboldt was among his fellow students. BUCH made rapid progress, and manifested a peculiar aptitude for geological studies, as well as mineralogy. In 1797 he published *Verh. einer mineralogischen Beschreibung von Silesien*, in which he gave the results of his mineralogical and geological investigations of the mountains of Silesia, which had never previously

been systematically explored. Werner, the director of the academy, had propounded the Neptunian theory of geological formation, and Von Buch warmly espoused it. In his first investigations he classed basalt, gneiss, and mica schist among the aqueous formations. In 1797 Von Buch explored the Styrian Alps, while Humboldt was engaged in meteorological and audiometrical researches in the same regions. In the spring of 1798 Von Buch pursued his geological excursions into Italy, and his investigations there unsettled his convictions of the truth of Werner's Neptunian theory; he inclined to the belief that the leucitic and pyroxenic varieties of basaltic rocks must be of igneous formation. In 1799 he went to Naples, and saw Mount Vesuvius, which he revisited on Aug. 12, 1805, in company with Humboldt and Gay-Lussac, at the time of an eruption. In 1802 he visited the south of France and explored the regions of extinct volcanoes in Auvergne. The general aspect of the Puy-de-Dôme, with its cone of trachyte rock and its beds of basaltic lava, convinced him of the natural facts of igneous formations, and induced him to abandon Werner's exclusive doctrines of aqueous formation. The results of these geological researches were published in his *Geognostische Beobachtungen auf Reisen durch Deutschland und Italien* (2 vols. 8vo, Berlin, 1802-'9). From the south of Europe Von Buch turned to the north, and from July, 1806, to October, 1808, he explored the Scandinavian regions, carrying his investigations as far as the North cape. The results of these researches were some very important discoveries with regard to the geological formation of the crust of the earth, the climatology of different regions, and the geographical distribution of plants. Von Buch was the first to suggest the idea of the slow and gradual elevation of the land of Sweden above the level of the sea. The results of these explorations were published in his *Reise durch Norwegen und Lappland* (2 vols. 8vo, 1810). His explorations of the Alps in Switzerland, and of the mountains of Germany, induced Von Buch to put forth the opinion that the highest chains of mountains have never been covered by the sea, but are the result of successive upheavings through fissures of the earth's crust, the parallel direction of which is indicated by the principal chains of mountains in the Alps. This suggestion had already been made by Avicenna, and it has since been developed into a general theory by Elie de Beaumont. About this time, also, Von Buch published his views, which have since been confirmed by the labors of Nöggerath, with regard to the formation of amygdaloid agates, or almond stones, in the porosities of melaphyre. In 1815 Von Buch went to the Canary islands, accompanied by Christian Smith, the Norwegian botanist. The volcanic islands, with the gigantic peak of Teneriffe, became the basis of an elaborate series of investigations on the nature of volca-

nic activity, and the results produced by fire, which he published in his *Physikalische Beschreibung der Canarischen Inseln* (1825). He next visited the basaltic group of the Hebrides and the coasts of Ireland and Scotland. He continued his geological excursions and investigations until almost the last day of his life. Eight months before he died he made another visit to the extinct volcanic region of Auvergne. His life was one continued round of observation, travel, and investigation. His journeys and explorations were made mostly on foot; with a change of linen and a geological hammer, he was equipped for any journey. Alexander von Humboldt styled him "the greatest geologist of the age." A catalogue of his numerous writings is given by Boné in the almanac of the Vienna academy of sciences for 1853.

BUCHAN, David, a British explorer, born in 1780, lost at sea about 1837. He obtained a lieutenant's commission in the navy in 1806, and in 1810 commanded a schooner on the Newfoundland station. His admiral, Sir John Duckworth, despatched him to the river Exploit, for the purpose of exploring the interior and opening a communication with the natives. He reached the mouth of the river in January, 1811, and with 34 men and three guides penetrated with the greatest difficulty 130 miles into the country. In 1816 Buchan was promoted to the rank of commander, and in 1818 was appointed to the command of an arctic expedition. The Greenland whalers having reported the sea to be remarkably clear of ice, the admiralty fitted out two expeditions that year, one to discover the northwest passage, the other to reach the north pole. The first, intrusted to Capt. Ross and Lieut. Parry, proved unsuccessful. The Dorothea and Trent were selected for the other expedition, under Capt. Buchan and Lieut. Franklin. Among the officers were several who have since distinguished themselves in arctic voyages. The two vessels sailed in April and reached the place of rendezvous, Magdalena bay, Spitzbergen, about June 1, where they found immense glaciers, and that gigantic barrier of ice which has hitherto frustrated every effort to reach the north pole. Twice they attempted to penetrate it in vain. On June 7 they put to sea, and after several efforts to force a passage were shut up for 13 days in a floe of ice within three miles of land, and with the water so shoal that they could see the bottom. At length the floe separated and bore to the south at the rate of three miles an hour. They reached the open sea and took shelter in Fair Haven. On July 6, finding that the ice was again driving northward, they sailed in that direction until the barrier of ice closed upon them, reaching lat. 80° 34' N., which was the most northerly point gained. They attempted in vain to drag the vessels on by ropes and ice anchors, for the current carried them three miles an hour to the southward. The only result of the effort was the loss of several lives. Capt. Buchan then stood over toward

the coast of Greenland, but both vessels encountered a heavy gale of wind, which, with the constant shock from floating ice, so disabled the Dorothea that she was in a foundering condition. They therefore put about, and reached Deptford Oct. 22. In 1823 Buchan was promoted to the rank of captain, and commanded for some time on the Newfoundland station. In 1825 he became high sheriff of that colony, which post he held for several years. He then went on a new expedition into the northern seas, from which he never returned. His ship is supposed to have been burned at sea, but nothing is known with certainty of the fate. In 1839 the admiralty struck his name from the list of living captains. He wrote no account of his voyages, but Capt. Beechey, who served on board the Trent, has supplied the commission. Science is indebted to Buchan for important observations upon marine undercurrents, the variations of the magnetic needle, the temperature of the deep sea as compared with that of the surface, and the compression of the globe at the poles.

BUCHAN, Elizabeth (Stimpson), the founder of a Scotch sect, now extinct, born near Banff in 1738, died in 1791. She was educated at the Scottish Episcopal church, but on her marriage to Robert Buchan, in Glasgow, became like him a Burgher seceder. About 1773 she broached dogmas of her own, and soon deserted her husband and moved to Irvine, where she made a number of converts. These persons in all, set up a community at a farm-house 13 miles from Dumfries, waiting for the millennium or the day of judgment, and fasting for weeks in the expectation that they would be miraculously fed. A few left, accusing Mr. Buchan of tyranny and dishonesty, but the majority of her votaries were faithful to her to the last. She called her disciples around her deathbed and communicated to them, as a secret, that she was the Virgin Mary, who had been wandering through the world since the Saviour's death, and that she was only going to sleep now, and would soon conduct them to the New Jerusalem. Her disciples, in the expectation of her reappearance, refused to bury her until ordered to do so by a magistrate.

BUCHAN, William, a Scottish physician, born at Anernum, Roxburgh, in 1729, died in London, Feb. 25, 1805. After practising for a short time in the north of England, where he distinguished himself by his successful treatment of the diseases of children, he removed to Edinburgh, where he took the degree of M.D. There, in 1770, he published his "Domestic Medicine," of which during his lifetime large editions were published. It was translated into all modern languages, and obtained for the author a complimentary letter and gold medal from Catharine II. of Russia.

BUCHANAN, I. A. S. W. county of Virginia, bounded N. E. by West Virginia, and separated from Kentucky on the N. W. by the Cumberland mountains; area, 500 sq. m.; pop. in 1870

3,777, of whom 47 were colored. Much of the surface is mountainous. It is watered by Louisa, Russell, and Tug forks of the Sandy river. The chief productions in 1870 were 3,184 bushels of wheat, 82,624 of Indian corn, 14,990 of oats, and 71,955 lbs. of butter. There were 508 horses, 1,565 milch cows, 2,953 other cattle, 5,434 sheep, and 6,686 swine. Capital, Buchanan. II. A N. E. county of Iowa; area, 576 sq. m.; pop. in 1870, 17,034. The Dubuque and Sioux City railroad traverses the centre of the county. It is watered by affluents of the Red Cedar river, and by the Wapsipinicon river and Buffalo creek, which intersect it, and is well timbered. The chief productions in 1870 were 719,381 bushels of wheat, 617,310 of Indian corn, 554,530 of oats, 85,282 of potatoes, 28,567 tons of hay, 39,990 lbs. of wool, and 533,519 of butter. There were 6,563 horses, 6,130 milch cows, 8,555 other cattle, 10,687 sheep, and 16,006 swine. Capital, Independence. III. A N. W. county of Missouri, separated from Kansas by the Missouri river; area, about 450 sq. m.; pop. in 1870, 35,109, of whom 1,953 were colored. It is intersected by the Little Platte river, and also drained by Castile and Livingston creeks. The soil is fertile. The railroads passing through the county are the Hannibal and St. Joseph, the Kansas City, St. Joseph and Council Bluff, the Marysville branch of the same, and the Lexington and St. Joseph branch of the North Missouri. The chief productions in 1870 were 239,874 bushels of wheat, 1,070,517 of Indian corn, 157,611 of oats, 122,051 of potatoes, and 3,172 tons of hay. There were 4,542 horses, 1,709 mules and asses, 3,871 milch cows, 5,475 other cattle, 8,729 sheep, and 20,711 swine. Capital, St. Josephs.

BUCHANAN, Claudius, D. D., an English missionary, born at Cambuslang, near Glasgow, March 12, 1766, died in Hertfordshire, England, Feb. 9, 1815. He was educated at Cambridge, and in 1796 appointed chaplain of the East India company; and when the marquis of Wellesley founded a college at Fort William, he was nominated vice provost and classical professor. In 1808 he returned to England. He was the author of "Christian Researches in Asia," and other works, which had a great influence both in England and America in directing the attention of the religious public to the promotion of Christianity in India. At the time of his death he was employed in superintending an edition of the Scriptures for the Syrian Christians of the Malabar coast. His biography has been written by Dr. Hugh Pearson (London, 1819; new ed., 1846).

BUCHANAN, Franklin, an American naval officer, born in Baltimore about 1800. He entered the navy in 1815, was the first superintendent of the United States naval academy (1845-'7), became captain in 1855, and in 1861 was commandant of the navy yard at Washington. On April 19, the day when the Massachusetts volunteers were attacked in the streets of Baltimore, he sent in his resignation; but finding

that Maryland did not secede, he asked to be restored. His request being refused, he entered the confederate service, superintended the fitting up of the iron-clad Merrimack, and commanded this vessel in her attack upon the federal fleet in Hampton roads. He was wounded during the engagement of the first day (March 8, 1862), and forced to relinquish the command. He subsequently rose to the rank of admiral in the confederate service, and commanded the fleet in Mobile bay which was defeated by Farragut, Aug. 5, 1864. In this engagement he was severely wounded, taken prisoner, and detained until the close of the war. He has since been employed as an insurance agent in Mobile.

BUCHANAN, George, a Scottish author, born at Killearn, Stirlingshire, in February, 1506, died in Edinburgh, Sept. 28, 1582. He was sent to Paris for his education, returned in about two years to Scotland, and in 1523 was engaged in a border foray and the storming of a castle in England. Two years later he took a degree at St. Andrews, and shortly after went again to Paris, where he remained connected with the university several years. In 1537 he was in Scotland as tutor to one of the sons of James V., when he wrote some satirical poems directed against the monks and friars. Obligated to flee, he repaired successively to London, Paris, Bordeaux, and Portugal. His occupation was probably that of teaching the rudiments of Latin in the universities, but he published four tragedies upon the classical model, and various odes and poems, by which his name became widely known. In 1548 he was imprisoned by the inquisition at Coimbra, and after a year and a half removed to a monastery, where he made a celebrated version of the Psalms in Latin verse. After remaining here a few months he was dismissed and sailed for England. In 1553 he returned to France, and in 1562 was at court in Scotland, and classical tutor to Queen Mary, who showed him many favors. In 1566 he was made principal of St. Leonard's college, and about this time declared himself a Protestant. His *Fratres Fraterrimi*, another satire upon the friars, was published in 1564. In 1566, and again in 1567, he collected and published an edition of his poems. Entering the service of Murray, he became one of the bitterest of the queen's accusers, and was one of the chief agents in the production of the celebrated casket letters. In the investigation at York in 1568 he was a representative of the Scottish lords. His *De Maria Scotorum Regina totaque ejus contra Regem Conjuracione, Fædo cum Bothuellio Adulterio, &c.*, was first printed in London in 1571, and translated into English the same year ("A Detection of the Doings of Mary Queen of Scots"). It contains copies of the casket letters, and is the principal source of the accusations which have since been brought against Mary's character. In 1570 he was intrusted with the education of James VI., then

four years old. The year 1579 was marked by the publication of his *De Jure Regni apud Scotos*, a treatise, under the form of a dialogue, concerning the institutions of Scotland, upon the principles of government and society. For nearly two centuries this book, which inculcates the doctrine that governments exist for the sake of the governed, was held up as containing the sum of all heresy and rebellion. It was burnt, together with the works of Milton, in 1683, at Oxford, and again in 1684 received a formal condemnation and burning from the Scotch parliament. His last production, *Rerum Scotticarum Historia*, in 20 books, was published in 1582.

BUCHANAN, James, fifteenth president of the United States, born at Stony Batter, Franklin co., Penn., April 22, 1791, died at Lancaster, Penn., June 1, 1868. His father emigrated to the United States from Ireland in 1783; his mother was the daughter of a farmer of Adams co., Penn. He graduated at Dickinson college in 1809, studied law at Lancaster, was admitted to the bar in 1812, and soon obtained a large practice. Although a federalist, and avowedly opposed to the war of 1812, he headed a list of volunteers, and enlisted as a private in a company which marched to the defence of Baltimore. He was elected to the Pennsylvania legislature in 1814, and in 1821 was elected to congress, where he remained ten years. In respect to the tariff he held that duties ought to be imposed merely for revenue purposes, although indirectly certain branches of manufacture might happen to be benefited more than others. In the presidential election of 1828 he took an active part in favor of Gen. Jackson, and in the next congress was chairman of the judiciary committee. In 1829 articles of impeachment were passed against James H. Peck, judge of the United States court for the district of Missouri, who had committed to prison and debarred from practice a lawyer who had published some strictures upon one of his judicial decisions. Mr. Buchanan was chosen one of the five managers on the part of the house of representatives, and closed the case, confining himself to the legal and constitutional principles involved. Though the senate, by a vote of 22 to 21, refused to convict Judge Peck, it shortly afterward unanimously passed an act obviating whatever technical objections then stood in the way of his conviction, and so framed the law that no judge has since ventured to commit a similar offence. In 1831, at the close of his fifth term, Mr. Buchanan withdrew from congress, and was soon afterward selected by President Jackson as envoy extraordinary and minister plenipotentiary at St. Petersburg. He concluded the first commercial treaty between the United States and Russia, which secured to our merchants and navigators important privileges in the Baltic and Black seas. In 1833 he was elected to the United States senate. A great revulsion in politics had taken place during his absence

from the country. A rupture had occurred between President Jackson and Mr. Calhoun, which eventually led to the dissolution of Jackson's first cabinet; a new tariff had been enacted after a sharp struggle, and the battle against the renewal of the charter of the United States bank had been led to a fruitless issue. An attempt was made to deprive the president of the power of removal from office without the advice and consent of the senate. Mr. Buchanan defended President Jackson and urged the necessity of appointing officers by the president alone during the recess of congress.—During the session of 1835-'6 a new element was introduced into national politics. Up to this period the anti-slavery agitation had been mainly confined to a small body of persons. The only political aspect of the question was the presentation to congress of petitions for the abolition of slavery in the District of Columbia, and the prohibition of the slave trade between the states. Mr. Buchanan desired to stifle the agitation in the beginning by preventing the discussion of slavery in congress. He urged that congress should receive and consider petitions for the abolition of slavery in the District, and then declare that congress had no power to legislate on the subject. He said that the proper way was to leave this question where the constitution left it, to the slaveholding states themselves. He was in favor of the recognition by the United States of the independence of Texas, and at a later day advocated the admission of Texas into the Union. Toward the close of Jackson's administration the French indemnity question had risen to a threatening importance. President Jackson insisted on the prompt payment of France of the debt due to our citizens; when the French chambers rejected the recommendation of Louis Philippe's ministry to provide for the payment of the indemnity, President Jackson asked an appropriation of \$3,000,000 for the increase of the navy and the defence of our maritime frontier. Mr. Buchanan, in supporting this demand of the president, revived the whole question, and clearly established the justice of the claim. During Mr. Van Buren's presidential term Mr. Buchanan's powerful debater came especially into play in support of the leading administration measure, the establishment of an independent treasury. He defended the preemption privileges of settlers on the public lands; opposed the bill to punish by fine and disability federal officers who should attempt to interfere with any citizen's vote; sustained the veto power in opposition to John C. Clay during the administration of John Tyler, and spoke against the ratification of the Webster-Ashburton treaty, not so much because the northeastern boundary line between the United States and the British provinces of North America, determined by that treaty, did not correspond with what he thought it ought to be, as because it did not settle other matters of dispute then existing between the two

ments. He was one of the earliest advocates of the annexation of Texas, arguing that while it would afford that security to the northern and southwestern slave states which have a right to demand, it would in some respects operate prejudicially upon their immediate pecuniary interests; but to the middle western, and more especially to the New England states, it would be a source of unedged prosperity. It would extend their commerce, promote their manufactures, and increase their wealth." Although the treaty of annexation received only 15 votes in the Senate, after the election of President Polk it was finally admitted by joint resolutions passed three days before his inauguration. Buchanan was the only member of the committee on foreign relations in the Senate who reported favorably on the admission.—On the accession of Mr. Polk to the presidency Buchanan was appointed secretary of State, and had the initiation of those measures which he had hitherto defended as chairman of the committee on foreign relations in the Senate. England and America had both claimed the whole northwestern territory. A protocol between Mr. Buchanan and Lord Pakenham induced England to accept a compromise line of lat. 49° N. Mr. Buchanan had felt himself obliged to offer this line, because Mr. Tyler had offered it before him, but it was rejected by Mr. Pakenham. Hereupon Mr. Buchanan, in an elaborate State paper, exhibited the claims of the United States to the whole territory, and concluded by a formal withdrawal of his offer. The British government shortly afterward proceeded to settle the boundary question on the basis first proposed by Mr. Polk, declaring it to be its ultimatum. The president referred the proposition to Congress, who advised acceptance. During the Mexican war Mr. Buchanan's chief labors as secretary of State were directed to the avoidance of European intervention in the shape of mediation or guarantees.—At the close of Mr. Polk's administration, Mr. Buchanan retired to private life; his views of passing events were freely expressed, and he watched with apprehension the progress of the slavery agitation in the Southern states. While yet in the cabinet of Mr. Polk, he had written his so-called Harvest Letter to his friends in Pennsylvania, advising the extension of the Missouri compromise line of lat. 36° 30' N. to the Pacific ocean; but this proposition, when introduced into Congress, was voted down. At last, by the joint efforts of Clay, Webster, Cass, and their friends in the House, the compromise measures of 1850 were passed. Soon afterward Mr. Buchanan wrote a letter to a union meeting held in Philadelphia, in which he fully approved them.—One of the first acts of Mr. Pierce's administration was the appointment of Mr. Buchanan as minister to England (1853). A principal object of his mission was the Central American

question, which the Clayton-Bulwer treaty had not settled. Mr. Buchanan discussed the whole matter in an elaborate and perspicacious protocol. Our relations with Spain also came under his notice. Various causes of complaint had arisen on our part, and at last one of our vessels, the *Black Warrior*, was fired into by a Spanish war steamer on the coast of Cuba. President Pierce thought the opportunity had arrived for settling all difficulties at once by a proposal to purchase the island of Cuba at a price which would enable Spain to extricate herself from her financial embarrassments. This delicate negotiation was confided to Mr. Soule, then our minister to the court of Madrid; but the president thought it advisable that our ministers to England and France (Mr. Buchanan and Mr. Mason) should act in concert with Mr. Soule. The result was a meeting at Ostend, afterward adjourned to Aix-la-Chapelle, and the drawing up of a memorandum, sometimes spoken of as the Ostend manifesto, in which the ministers set forth the importance of Cuba to the United States, the advantages which would accrue to Spain from the sale of it at a fair price, the difficulty which Spain would encounter in endeavoring to keep possession of it by mere military power, the sympathy of the people of the United States with the inhabitants of the island, and finally, the possibility that Spain, as a last resort, might endeavor to Africanize Cuba, and become instrumental in the reenacting of the scenes of Santo Domingo. They believed that in case Cuba was about to be transformed into another Santo Domingo, the example might act perniciously on the slave population of the Southern states. In this case, they held that the instinct of self-preservation would call for the armed intervention of the United States, and we should be justified in wresting the island by force from Spain.—Mr. Buchanan returned to the United States in April, 1856. The democratic convention, held at Cincinnati in June following, nominated him unanimously for the presidency, and he was elected, receiving 174 electoral votes from 19 states, against 114 for John C. Fremont, and 8 for Millard Fillmore. He took an early opportunity to set forth his sentiments on the Kansas question. In an address to the students of Franklin and Marshall college at Lancaster, in November, 1856, he declared that the object of his administration would be to destroy any sectional party, whether in the north or in the south, and to restore national and fraternal feeling between the different sections. In his inaugural address, March 4, 1857, he clearly expressed himself on the subject of the slavery agitations and the mode in which the difficulties in Kansas were to be settled. He approved the Leocompton constitution, and on Feb. 2, 1858, addressed a special message to Congress, asserting the power of the people of Kansas to "change their constitution within a brief period" after being admitted into the Union, notwithstanding a clause

in the constitution, which, after the year 1864, required a two-thirds vote for that purpose. A rebellion in Utah broke out shortly after Mr. Buchanan's accession to the presidency. The Mormons resisted the authority of the national government, treated loyal citizens as enemies, and formed alliances with the Indians. A strong military expedition was sent to Utah; but in order to avoid a prolonged guerilla warfare, the president consented in January, 1858, that Col. Thomas L. Kane, who had in former years greatly befriended the Mormons in a time of famine, should go out to their country to endeavor to bring them to peaceful submission to the laws; and two citizens were appointed in April as peace commissioners to accompany the army. These efforts proved successful; and on June 7 Mr. Buchanan informed congress that the rebellion was ended by the submission of the Mormons, and that the reinforcements ordered for the army would not be required. The 35th congress met Dec. 5, 1859. In the senate there was a strong democratic majority; in the house the republicans had a plurality, but the balance of power between the two parties was held by a small body calling themselves Americans. In June, 1860, a homestead bill was passed, allowing actual settlers to pre-empt 160 acres of public land, paying 25 cents an acre, at the end of five years; the bill was vetoed by the president, and failed to receive in the senate the majority of two thirds requisite for its passage over the veto. As the term of Mr. Buchanan's administration drew to a close, it became clear that a sectional conflict was impending. The election of Mr. Lincoln precipitated the outbreak. In his annual message in December, 1860, Mr. Buchanan expressed a hope that the issue of disunion would be averted. He laid the blame of the troubles upon the unwarrantable agitation at the north of the slavery question, which had "produced its malign influence on the slaves, and inspired them with a vague idea of freedom." He argued that the people of any state who felt themselves aggrieved by the federal power had only the revolutionary right of resistance; that it was the duty of the executive to take care that the laws be faithfully executed; yet circumstances had put it out of the power of the president to do this in South Carolina. He could not order out the army except upon the demand of the judicial authority, and this authority did not then exist in that state. He argued that the constitution had given to congress "no power to coerce into submission any state which is attempting to withdraw, or has actually withdrawn, from the confederacy." South Carolina formally seceded on Dec. 20, and sent commissioners to treat with the president for the delivery of all the public property in that state, and to negotiate for "the continuance of peace and amity between that commonwealth and the government at Washington." The president replied that he had no power to enter upon such negotiations, and

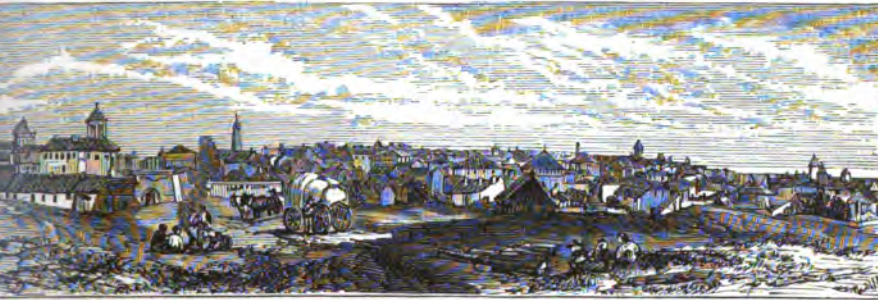
could only submit the whole question to congress. He could therefore meet the commissioners only as "private gentlemen of the highest character," and transmit to congress any propositions which they might have to make. He also refused to order the withdrawal of the troops from Charleston harbor. The cabinet broke up. Mr. Cobb, secretary of the treasury, had before resigned; and Mr. Thompson, secretary of the interior, had done his post without resigning. Mr. Cass, secretary of state, resigned because the president would not send reinforcements to Charleston harbor; and Mr. Floyd, secretary of war, because he would not withdraw the forces already there. Early in January the steamship *Star of the West* was despatched from New York with supplies and reinforcements to Fort Sumter, but was unable to introduce them. On Jan. 15, 1861, Mr. Holt, then secretary of war, wrote to the governor of North Carolina by order of the president, that the forts in that state, "in common with the other forts, arsenals, and other property of the United States, are in charge of the president, and that if assailed, no matter from what quarter, and under what pretext, it is his duty to protect them by all the means which the law has placed at his disposal;" adding, however, that it was not his purpose at present to garrison the forts, as he "considered them entirely safe under the protection of the law-abiding government for which the people of North Carolina had ever been distinguished; but should they be attacked or menaced with danger of being seized or taken from the possession of the United States, he could not escape from his constitutional obligation to defend and preserve them." This was his last important public act. Immediately after the inauguration of Mr. Lincoln, March 4, 1861, Mr. Buchanan retired to his home at Lancaster, Penn., where he passed the remainder of his life, taking no part in public affairs. In 1866 he wrote a book, "Mr. Buchanan's Administration," explaining and defending the measures which he had sanctioned and adopted.

BUCHANAN, Robert, a Scottish poet, born Aug. 18, 1841. He was educated at the school and the university of Glasgow, and his 20th year published a volume of poems entitled "Undertones," followed by "Idylls and Legends of Inverburn" (1865), and "Loud Poems" (1866). He also wrote a tragedy, "The Witch-finder," which was produced at Sadler's Wells theatre in London, and in 1868 gave readings from his poems in that city. His subsequent works are: "The Land of Lorne," in prose (2 vols., 1871); "Napoleon Fallen, a Lyrical Drama" (1871); and "Dramas of Kings" (1871). In October, 1871, he published in the "Contemporary Review" of London, under the *nom de plume* of Thomas Maitland, an article "On the Fleshly School of Poetry," in which many of the prominent living poets of England were criticised in severe

s. Mr. Buchanan subsequently assumed authorship of the article, and republished with additions. The result was an acrimonious controversy with Mr. Swinburne.

BUCHAREST, or **Bukarest** (Wallachian, *Bukurest*, "the city of pleasure"), the capital of Romania and of the principality of Wallachia, lat. 44° 25' N., lon. 26° 5' E., on the Dimiza, about 80 m. from its confluence with the Danube; pop. in 1867, 141,754, of whom 15,000 were Germans. The city, which without walls, covers an area of 4 by 8 m., is sufficient for a much larger population. The streets are generally narrow, but there are public places and squares. The principal streets have recently been paved and lighted. The houses are mostly of wood, a single story high, but often spacious, and ornamented with balconies and surrounded by gardens. There are about 130 churches, among which the metropolitan Greek church; the church of Rimnik, with a convent, which is the seat of the bishop of Rimnik; a Catholic church, with a Franciscan convent; a Lutheran church, founded in 1757, but since 1821 belonging to the Hungarian evangelic community; an Armenian church; and five synagogues for German and Spanish Jews. There

are also 20 convents attached to the churches, mostly of the Greek rite. The city has a university, three gymnasia, a central school for females, 13 elementary schools, and many private seminaries; several hospitals, a lying-in house, a great orphan establishment founded in 1862 by the princess Helena, an opera house, and four theatres for French, German, and Roumanian plays. There are also a corso, a fine promenade, a great bazaar, and many coffee houses. Bucharest is the residence during a part of the year of the magistrates and great landholders of the principality, and is noted for its gayety. Although oriental in external appearance, in other respects it is assuming more and more the aspect of a European city. French literature is the favorite study, and the French language is spoken by the upper classes. Bucharest is the chief commercial emporium of Roumania, being connected by railway with Giurgevo and Galatz on the Danube, and with Jassy and Czernowitz, and carries on an active trade in grain, wool, honey, wax, wine, cattle, and hides. In the environs are extensive slaughter houses, where excellent tallow and smoked meat are produced. The merchants are mostly Greeks, Armenians, and Jews; the artisans and tradesmen Germans.



Bucharest.

manufacturing industry is inconsiderable, the principal productions being Turkish fabrics of gold and silver cloth, silver ware, carpets, silks, iron work, saddlery, furs, beads, necklaces, pipes, and tobacco. — Bucharest was founded by Radul the Black of Transylvania, who conquered Wallachia toward the close of the 13th century. At the end of the 16th century it fell into the hands of the Turks, who held it. In 1769 it was captured by the Russians, and in 1789 by the Austrians. By the treaty concluded here, May 28, 1812, the sovereignty of Wallachia was confirmed to Turkey, but under the protectorate of Russia. In 1821 a revolt broke out among the Greek population, in connection with the rising under Ypsilanti, but order was soon reestablished by the Turks. In 1828 the Russians took possession of the town, and in 1829 the treaty of peace of Adrianople brought it under the rule of the hospodar of Wallachia, in subordination to the supreme au-

thority of Turkey. The town was desolated by a great fire, April 4, 1847. In June, 1848, a rebellion broke out against Prince Bibesco. Turkish forces occupied the town in September, and Russian troops in October of the same year, and were stationed here until May, 1851. Russian troops again held it from July, 1853, to August, 1854, from which time Austrian forces were quartered there until March, 1857. The international congress for the adjustment of the affairs of the Danubian principalities, in accordance with the regulations of the peace conference of Paris, was held at Bucharest in 1858. The union of the principalities of Wallachia and Moldavia, granted by the sultan, Nov. 12, 1861, was proclaimed at Bucharest, Dec. 23; the first prince being Col. Cuza, who had been chosen hospodar of both principalities in 1859. In 1866 a revolutionary movement took place in Bucharest, which forced Cuza to abdicate. (See ROMANIA.)

BUCHARIA. See BOKHARA.

BUCHÉZ, Philippe Joseph Benjamin, a French physician and writer, born at Matagne, March 31, 1796, died at Rodez, Aug. 12, 1865. He was a violent opponent of the restoration of the Bourbons, was engaged in conspiracies against them, and in 1821 was instrumental in founding the French carbonari society, in imitation of that of Italy. A few weeks after the establishment of this society in France, its leaders boasted that it had 200,000 members. The conspiracy was discovered, and many of those engaged in it were convicted and punished with imprisonment. The judges disagreeing in the case of Buché, he was set free, and immediately devoted himself to scientific studies, published a treatise on hygiene, and established the *Journal des progrès des sciences et institutions médicales*. He was also a contributor to a weekly periodical, *Le producteur*, which advocated the doctrines of St. Simon; but when the pantheistic direction of the new doctrine became apparent, he separated himself from the school. After the revolution of 1830, he established *L'Européen*, a review, as the organ of his system, which he denominated Buchézism (1831-'2; 2d series, 1835-'8). In 1833 appeared his *Introduction à la science de l'histoire, ou science du développement de l'humanité*, in which his philosophical views are elaborately presented. In concert with M. Roux-Lavergne, he commenced in the same year the publication of the *Histoire parlementaire de la révolution française* (40 vols. 8vo, 1833-'8). One of his most important works is the *Essai d'un traité complet de philosophie, au point de vue du catholicisme et du progrès* (3 vols. 8vo, 1839). The revolution of February, 1848, threw him again into politics. He became deputy mayor of Paris under Marrast, was elected member of the national assembly from the department of the Seine, and called to the presidential chair. Not being reelected, he retired to private life, continued his literary and philosophical studies, and published his *Histoire de la formation de la nationalité française* (2 vols. 16mo, 1859).

BÜCHNER, I. Georg, a German poet, born at Goddelan, near Darmstadt, Oct. 17, 1818, died in Zürich, Feb. 19, 1837. He was obliged to leave the university of Giessen on account of his participation in the political disturbances of 1834, and resumed his studies at Strasburg. In 1836 he took his degree as doctor of philosophy at Zürich, and for a few months previous to his death lectured on comparative anatomy. His principal poetical work is *Danton's Tod* (Frankfort, 1835). He also translated several of Victor Hugo's dramas. His posthumous writings were published in 1850. **II. Friedrich Karl Christian Louis**, a German philosopher, brother of the preceding, born at Darmstadt, March 29, 1824. He studied at Darmstadt, Strasburg, Giessen (where he took his doctor's degree in 1848), Würzburg (under Virchow), and Vienna. He practised as a physician in

his native place, and in 1854 became private teacher and assistant physician in the clinical school of Tübingen, which post he lost by the publication of *Kraft und Stoff* (Frankfort-on-the-Main, 1855; 10th ed., 1869), in which he deals with the forces and phenomena of nature upon the principle that nothing beyond material forces is known to us. An English translation by T. Frederick Collingwood, under the title "Force and Matter," first published in 1855, has since passed through 12 editions. He afterwards resumed his medical practice at Darmstadt. Among his other works are: *Natur und Geist* (1857; 2d ed., 1864); *Physiologische Bilder* (Leipsic, 1861); *Aus Natur und Wissenschaft* (1862), analyzing the system of Darwin; Schopenhauer, and others; *Das Alter des Menschengeschlechts* (1864), a German version of Lyell's "Antiquity of Man;" *Sechs Vorlesungen über die Darwin'sche Theorie* (1868); and *Die Stellung des Menschen in der Natur, der Vergangenheit, Gegenwart und Zukunft* (8 parts, Leipsic, 1869-'70), published simultaneously in German, English, French, and Italian (English by W. S. Dallas, "Man in the Past, Present, and Future," 1872). The cardinal points of Büchner's philosophy are: the eternity of matter, the indestructibility of forces, the universal co-existence of light and life, and the infinity of forms of being, both in time and space. In 1872-'3 he delivered lectures in the United States. **III. Alexander**, brother of the preceding, born at Darmstadt, Oct. 25, 1818. In 1852 he became private teacher at the university of Zürich, and since 1857 has been professor at Valenciennes and Caen, France. Among his works in German are: *Geschichte der englischen Dichtkunst seit dem 13. Jahrhundert* (2 vols., Darmstadt, 1855), and the novel *Chatterton und Lord Byron's letzte Liebe* (Leipsic, 1862-'3); and in French, a translation of Jean Paul Richter's poetry, prepared jointly with Charles Léon Dumont (2 vols., Paris, 1862), and *Les comédies de Shakespeare* (Caen, 1864). **IV. Luise**, sister of the preceding, born June 12, 1822. She has written poetry and novels, attended the Leipsic women's rights convention in 1867, lectured on history in 1868, acted in 1869 as president of the Berlin woman's rights association, and established at Darmstadt, with the assistance of the princess Alice of Hesse, a finishing school for poor girls. Her principal work, *Die Frauen und ihr Beruf* (Frankfort, 1855), has passed through several editions, and has been translated into English, Russian, and Dutch. In 1869 appeared her *Praktische Versuche zur Lösung der Frauenfrage*, and in 1870 she assisted in editing the Berlin monthly periodical, *Der Frauenfreund*.

BUCHON, Jean Alexandre, a French writer, born May 21, 1791, died in Paris, April 21, 1846. He began life as an anti-Bourbon journalist, and his first work, a biography of Tassé, was seized by the government. He left France in 1821, lectured on dramatic art in England, and gathered in various parts of Europe

als for his *Collection des chroniques nationales françaises* (47 vols., Paris, 1824-'9). He collected, chiefly in Greece, original materials relating to the French occupation of the East during the crusades, and published the results of his researches in several works.

BUCHU (Hottentot, *bookoo*), the leaves of several species of *barosma*, a genus of the family *rutaceæ*. *B. crenata*, *B. crenulata*, and *B. ratifolia* yield each a variety, distinguished respectively as *tert* or round, *medium*, and *long*. The leaves contain a highly volatile extractive, and in Buchu is used in medicine as a substance, extract, infusion, and tincture. Its active principles, especially the volatile oil, having been absorbed, are eliminated by the kidneys, which gently stimulate. Sweating may be produced by it under favorable circumstances. It is chiefly employed in chronic affections of the urinary organs, especially of the ureters and bladder.

BUCK, the male of several wild animals of the deer family, and especially the male of the fallow deer of England, *dama vulgaris*. The term buck is also applied correctly to males of the roe (*capreolus caprea*) of Europe, of the spotted axis (*axis maculata*) of India, of the antelope, and of the wild and domestic goat; properly to the male of the American deer (*virginianus*), of the black-tailed deer (*macrotis*), and of the Mexican deer (*C. mexicanus*). It is also improperly applied to the American elk or wapiti (*cervus Canadensis*), the true name of the males of such deer as *antelope* as *cervi* is stag or hart, while that of the male is hind. Wherever the word buck is correct of the male, doe is proper for the female. The young of both are indiscriminately known as fawns, though the young of the stag is properly called a calf. (See **DEER**, and **FALLOW DEER**.)

BUCKAU, a town of Germany, in the Prussian province of Saxony, on the Elbe, closely adjoining Magdeburg; pop. in 1871, 9,696. It has several flourishing manufactories, embracing the machine works of the Hamburg and Magdeburg steamship company.

BUCKEBURG, a town of Germany, capital of the principality of Schaumburg-Lippe, on the river Aa, 6 m. E. S. E. of Minden; pop. in 1871, 4,214. It has a large castle, surrounded by a park, and a gymnasium. In the vicinity is the summer palace of Baum.

BUCKEYE. See **HORSE CHESTNUT**.

BUCKINGHAM, a central county of Virginia, bounded N. and N. W. by the James river, and S. by the Appomattox; area, 680 sq. m.; pop. in 1870, 18,871, of whom 7,711 were colored. The surface is somewhat hilly and the soil not very rich, except near the rivers. Near Willis mountain are gold mines. Iron is found here, and valuable slate quarries have been opened near the Slate river. The James River canal passes along the border of the county. The chief productions in 1870 were 76,694 bushels of wheat, 112,336 of Indian corn, 96,314 of oats, and 809,937 lbs. of tobacco. There were 1,138 horses, 1,819 milch cows, 2,958 other cattle, 2,922 sheep, and 6,898 swine. Capital, Marysville.

BUCKINGHAM, a parliamentary and municipal borough of England, the county town of Buckinghamshire, 50 m. N. W. of London; pop. of the municipal borough in 1871, 3,708. It is built on a peninsula formed by the river Ouse, which is here crossed by three bridges. A branch of the Grand Junction canal runs through it, and a branch of the London and Northwestern railway gives easy communication with the metropolis. The chief public buildings are the town hall, the jail, and the large parish church, erected in 1781. Buckingham once employed many women in lace-making, but this branch of industry is now declining. There are some breweries and tan yards, and in the vicinity are corn and paper mills and quarries of limestone and marble. There are numerous fairs for horses, cattle, and sheep. The reform act of 1867 deprived the borough of one of its two members of parliament.

BUCKINGHAM, Earls and Dukes of. The title of earl of Buckingham seems at first to have been borne by the younger sons of the Plantagenet kings; as was the case with the youngest son of Edward III., who was created duke of Gloucester by his nephew, Richard II., and subsequently murdered by his orders in the castle of Calais. Gloucester's son having died without issue, his heir, Humphrey, earl of Stafford, was created duke of Buckingham. He was succeeded by Henry Stafford, "the deep revolving, wily Buckingham" of Shakespeare, and grandson of the duke of Gloucester above mentioned. Having assisted Richard III. to gain the throne, he afterward conspired with the Lancastrians, was betrayed to Richard, and put to death in 1483. His son, Edward Stafford, was restored to his honors and estates by Henry VII. in 1486; but having fallen under the suspicions of Henry VIII., he was beheaded in 1521. With him ended the ducal title in the house of Stafford. The title of earl of Buckingham was revived in 1617, and conferred upon George Villiers. **I. George Villiers**, duke of Buckingham, an English statesman, born Aug. 20, 1592, died Aug. 23, 1628. He was a younger son of Sir Edward Villiers, of Brookebury in Leicestershire. His fine person, ready



Buchu (*Barosma crenata*).

wit, and polished manners gained the favor of James I., who attached him to his court as cupbearer. He became a knight and gentleman of the privy chamber, and on Jan. 1, 1616, was made master of the horse, and installed knight of the order of the garter. In August of the same year he was created baron of Whaddon and Viscount Villiers, and in the following January became earl of Buckingham and a privy councillor, and soon afterward his patent was made out as marquis. In 1616 he was appointed lord admiral of England, and subsequently chief justice in eyre of all the parks and forests on the south of Trent, master of the king's bench office, high steward of Westminster, and constable of Windsor castle. He possessed unbounded influence with the king, and largely controlled the distribution of peerages, offices, church preferments, the direction of the courts of law, departments of government, &c. In 1620 he married the daughter of the earl of Rutland. Three years afterward he accompanied Prince Charles, afterward Charles I., to Madrid to bring about a marriage between the heir of the English throne and the Spanish infanta; but the match was broken off by Buckingham's arrogance. During his absence in Spain he was created duke, and on his return secured the impeachment (1624) of the earl of Bristol, the English minister at Madrid. His last act during the reign of James was to negotiate in Paris an alliance with Henrietta Maria, daughter of Henry IV. of France, who was married to Charles in June, 1625. After the accession of Charles, Buckingham retained all his influence at court. He made alliances with foreign powers and broke them at pleasure, and involved England in war with France and Spain. After the failure of the expedition against Cadiz, he was impeached by the house of commons in 1626, but escaped conviction chiefly through the interference of the king. In the same year he was made chancellor of the university of Cambridge. In 1627 he commanded an expedition of 100 ships and 7,000 soldiers against La Rochelle and the isle of Ré; and notwithstanding its failure, and the expressed opinion of the house of commons "that Buckingham was the cause of all the national calamities," he was named by Charles commander-in-chief of the new expedition to be sent for the relief of the Protestants at La Rochelle. While preparing to sail from Portsmouth, Buckingham was assassinated by John Felton, a lieutenant in the army, who had suffered disappointment in his expectations of promotion.

II. George Villiers, second duke, son of the preceding, born in London, Jan. 30, 1627, died at Kirkby Moorside, in Yorkshire, April 17, 1688. He was educated at Cambridge under the royal patronage, and on leaving the university travelled on the continent with his brother Francis. The breaking out of the civil war recalled him to England, where he joined the king's forces under the earl of Holland, serv-

ing with that leader until he was defeated by Fairfax. His brother was killed, and Buckingham with difficulty reached the fleet of the prince of Wales, and escaped to France. Since he failed to return, in obedience to the summons of parliament, his estates were confiscated, and he was obliged to support himself in Antwerp, where he had established his temporary residence, by the sale of pictures belonging to his family. In 1651 he seized the opportunity offered by the temporary success of Charles II. in Scotland to reënter the army; but after the battle of Worcester, in which he fought under the king, he again took refuge on the continent. In the mean time a part of his estates had been given by the parliament to Fairfax, who allowed the duchess, Buckingham's mother, an ample revenue from her former possessions, and treated her with the greatest kindness. Buckingham again returned to England in spite of the threats of Cromwell, and was well received by Fairfax, whose only daughter he married in 1657. This marriage excited the displeasure of Cromwell, and the duke was committed to the tower, and afterward transferred to Windsor, where his confinement was less rigorous. He regained his liberty after the abdication of Richard Cromwell, and his estates at the restoration. Charles II. made him a member of the privy council, and lord lieutenant of Yorkshire. His influence over Charles, largely gained through his skill in pandering to the royal pleasures and through his own wit and buffoonery, greatly aided the overthrow of Clarendon, and was the principal incentive to many of the acts which at that time excited universal indignation against the king. For a time he fell into disfavor through some fickle acts which excited the distrust of Charles, and he was deprived of his offices; but the king was easily persuaded to restore them, and he regained his old position. When the "cabal" ministry was formed in 1670, Buckingham was one of its five members. He was soon afterward sent on an embassy to France to advance the plans of alliance which Charles then had in hand. Other important duties were intrusted to him; he was elected chancellor of the university of Cambridge, and remained in the full possession of official power and the king's favor until the overthrow of the cabal by the efforts of the commons, in 1674. During the summer of that year he was dismissed and at once joined the opposition party under Shaftesbury, in whose intrigues he was from this time an able ally. In the "popish plot," as it was called, and in the opposition agitations of the year following, he was deeply involved, and the remainder of his active life was occupied with factious schemes and efforts against his former friends. On the death of Charles he withdrew almost completely from political life, and devoted his time to hunting and similar amusements at his estate, Helmsley, in Yorkshire. He died in the house of a

ant from a fever brought on by a sudden cold
r a fox chase. Buckingham's private life
of the most profligate character, and in
less indulgence he surpassed even the most
adoned of Charles's court. It was by him
Louise de Querouaille, afterward duchess
Portsmouth, was brought to the king as his
ress; and he also introduced Nell Gwynn
the actress Davies to the royal favor. His
intrigues were numberless and of the
st character. He lived in open adultery
h the countess of Shrewsbury, and killed the
her husband in a duel; the countess is said
have stood by in the disguise of a page,
witness of the murder. Buckingham had
diant wit, but he was quite as famous for
fondness for low buffoonery and mimicry.
ny anecdotes of his adventures show the
ing enmities he made by this propensity.
resentment was always deep and lasting,
he was utterly unscrupulous in seeking
enge. There is little doubt that he was
cerned in a plot for the murder of the
e of Ormond, who had contributed to his
porary degradation in 1666. Buckingham
sted an enormous fortune in the most reck-
extravagance, and died in comparative
erty, though by no means in such destitu-
as Pope, in his desire to point a moral,
represented in the well known lines on
subject in his "Moral Essays." He died
hout issue, and was the last of his branch of
Villiers family. Several dramas and other
rary works left by him, including poems,
eches, and a "Satire against Mankind," were
lected in a volume in 1704. He is said to
e introduced the manufacture of glass into
gland from Venice, but this is doubtful.

BUCKINGHAM, or **Buckinghamshire**, **John Shef-**
t, duke of, an English statesman and poet,
n in 1649, died Feb. 24, 1721. He suc-
ded his father Edmund Sheffield as third
l of Mulgrave in 1658, early acquired some
inction in the navy and army, became a
ght of the garter and a gentleman of the
chamber under Charles II., served a little
ile under Turenne, commanded the expedi-
n to Tangier, was a member of the privy
uncil and lord chamberlain under James II.,
d acquired under King William (1694) the
e of marquis of Normanby. According to
lpole, he was an early lover of Queen Anne,
o appointed him lord privy seal, and created
a duke of Normanby and of the county of
 Buckingham in 1708. Several editions of the
rks of Buckingham appeared between 1723
d 1740. His "Essay upon Poetry" was at
t published both in English and Latin, and
nslated in 1749 into French. The highest
upliment conferred upon his "Essay on
ire" was the castigation inflicted in con-
quence of it, at the instigation of the earl of
chester, upon Dryden, who was supposed to
ve had something to do with the author-
p; but this is denied by Walter Scott, who
s that "Dryden's verses must have shone

among Mulgrave's as gold beside copper."
Dr. Johnson praises his memoirs as lively and
agreeable, but does not speak so highly of his
other works. He was eulogized by Roscom-
mon, Pope, and Dryden, and erected a monu-
ment to Dryden in Westminster abbey. On
the death of his son Edmund (1735) the du-
cal title became extinct. His third wife, the
countess of Anglesea, was a natural daughter
of James II. Her grandson, Sir Constantine
Phipps, inherited the Mulgrave and Normanby
titles and estates. The duke left an illegiti-
mate son, who was called Charles Herbert,
assumed the name of Sheffield, and became a
baronet; he was the great-grandfather of the
present Sir Robert Sheffield.

BUCKINGHAM, **James Silk**, an English traveller
and author, born at Flushing, near Falmouth,
in 1786, died in London, June 30, 1855. He
was educated for the church, but went to sea,
and was for several years master of a vessel.
In 1818 he was engaged by the pasha of Egypt
to determine the best site for a canal across the
isthmus of Suez; but after he had traced the
course of the ancient canal the project was
abandoned, and he was commissioned to pur-
chase ships in India and establish a trade be-
tween that country and Egypt. Having failed
to accomplish this, he assumed command of a
large ship belonging to the sultan of Muscat,
to be employed in the China trade on the sul-
tan's account. In 1816 he established a jour-
nal in Calcutta, but was expelled from India on
account of his censures of the Indian govern-
ment. He returned to London, and establish-
ed the "Oriental Herald" and the "Athenæ-
um." Between 1822 and 1830 he published
his "Travels in Palestine," "Travels in Ara-
bia," "Travels in Mesopotamia," and "Travels
in Assyria and Media," and subsequently two
volumes on Belgium, the Rhine, and Swit-
zerland, and two volumes on France, Pied-
mont, and Switzerland. He delivered lectures
throughout the United Kingdom on British In-
dia, against the company's commercial policy,
against impressment of seamen, intemperance;
the corn laws, and other important subjects.
Joining in the popular agitation of the reform
bill, he was in 1832 elected member of parlia-
ment for Sheffield, and retained his seat till
1837, after which he travelled extensively in
America, lecturing on temperance and anti-
slavery. He published his travels in ten octavo
volumes, three being devoted to the northern
United States, three to the slave states, three
to the eastern and western states, and one to
Canada, Nova Scotia, and New Brunswick. In
1849 he published a volume on "National Evils
and Practical Remedies," in 1851 became pres-
ident of the London temperance league, and in
1855 published the first two volumes of his
autobiography, but died before the work was
finished. A few years before his death the
East India company had granted him a pen-
sion of £300, and he also had a literary pen-
sion of £200 from the crown.

BUCKINGHAM, Joseph Tinker, an American journalist, born at Windham, Conn., Dec. 21, 1779, died in Cambridge, Mass., April 11, 1861. His father, Nehemiah Tinker, exhausted his whole property in aiding the American army during the revolution, and died in 1793, leaving his family destitute. At the age of 16 Joseph entered a printing office at Walpole, N. H., and a few months later became a printer at Greenfield, Mass., whence in 1800 he removed to Boston. In 1806, having by application to the legislature assumed his mother's name of Buckingham, he commenced the publication of "The Polyanthus," a monthly magazine, which was discontinued and not resumed till 1812. In 1809 he published for six months "The Ordeal," a weekly magazine. From 1817 to 1828, in company with Samuel L. Knapp, he published the "New England Galaxy and Masonic Magazine." In 1831, in connection with his son, he commenced the "New England Magazine," which was continued under his care till 1834, and contained contributions from numerous writers who afterward attained literary eminence. In 1824 he published the first number of the "Boston Courier," a journal which he continued to edit till 1848. Mr. Buckingham was several times elected to the legislature, and in 1847 and 1850 to the senate, of Massachusetts. He published "Specimens of Newspaper Literature, with Personal Memoirs, Anecdotes, and Reminiscences" (2 vols., Boston, 1850); "Personal Memoirs and Recollections of Editorial Life" (2 vols., 1852); and "Annals of the Massachusetts Charitable Mechanics' Association" (1853).

BUCKINGHAMSHIRE, or **Bucks**, an inland county of England, bounded N. by Northamptonshire, E. by Bedfordshire, Hertfordshire, and Middlesex, W. by Oxfordshire, and separated from Berkshire on the S. by the river Thames; area, 730 sq. m.; pop. in 1871, 175,870. The surface is pleasantly diversified, the northern parts being undulating, the middle occupied by the fertile vale of Aylesbury, and the southern traversed by the Chiltern hills. The principal rivers are the Thames, Thame, Ouse, and Colne. The most important productions are butter, cattle, lambs, and poultry. The Aylesbury sheep are famous for the weight and excellent quality of their fleeces. Buckingham, Aylesbury, Marlow, and Wycombe are the chief towns. The Northwestern and Great Western railways, and the Grand Junction canal, pass through the county.

BUCKLAND, Cyrus, an American inventor, born at Manchester, Conn., Aug. 10, 1799. In 1828 he became a pattern maker at the Springfield armory, and subsequently was designer of machinery and tools for the manufacture of arms. At different periods he occupied the post of inspector in all the various departments of the armory, and is now master machinist. Among his many valuable improvements is a set of stocking machinery, comprising 14 ma-

chines for working the gunstock from the rough state to a finish. It has been introduced into Great Britain and Russia. Among his other inventions are machines for rifling muskets, cutting the thread of the screw on the inside of the barrel, and milling the breech screw so as to produce a perfect interchange, every screw fitting any barrel.

BUCKLAND, I. William, D. D., an English geologist, born at Axminster, Devonshire, in 1784, died Aug. 14, 1856. He was educated at Oxford, where in 1818 he was appointed reader in mineralogy and in 1818 reader in geology. The clearness, force, and full information of his lectures made the study of geology very popular. He may be said to have founded the geological museum in Oxford, sparing neither time, travel, nor expense to supply it with specimens, which he classified, arranged, and described. This collection is more particularly rich in the remains of the larger fossil mammalia and other animals from the caves in different parts of England and Germany. In 1813 he communicated to the transactions of the geological society his "Descriptive Notes" of 50 miles of a coast survey of Ireland, which he had made in company with the Rev. W. Conybeare, dean of Llandaff. In 1820 he delivered a lecture before the university, which was published as "*Vindicta Geologicae*, or the Connection of Geology with Religion explained." In 1823 he published "*Reliquia Diluviana*," being the expansion of a paper he had communicated to the royal society (of which he was elected member in 1818) respecting the fossil remains of the elephant, hippopotamus, tiger, bear, hyæna, and sixteen other animals, discovered in a cave at Kirkdale, Yorkshire, in 1821, for which paper the society voted him the Copley medal, the highest honor in their gift. In 1825 he was made canon of Christ Church, and took the degree of doctor of divinity. In 1836 appeared his Bridgewater treatise on "Geology and Mineralogy considered with Reference to Natural Theology," which has always been the most popular of the series. He bestowed unusual pains upon this work, in which, led by the discovery of new facts, he modified his previous diluvial theory. His sketch of the structure of the Alps, in the "Annals of Philosophy," is regarded as one of the ablest of his geological writings. From its formation he identified himself with the British association for the advancement of science. He was one of the council of the royal society from 1827 to 1849, and was a member of the Linnean society. He was made dean of Westminster in 1845, when he relinquished his canonry at Oxford, but continued professor of geology and mineralogy. Removing to London, he was appointed trustee of the British museum, actively employed himself in advancing sanitary movements, and was mainly instrumental in procuring the establishment of the national museum of practical geology in London. In 1850 his mind became impaired, and the re-

under of his life was passed in retirement at Islip, near Oxford. He published several sermons, preached on various occasions, all of them distinguished rather by good sense than by scholastic divinity. **II. Francis Trevelyan**, an English naturalist, son of the preceding, born Oct. 17, 1826. He was educated at Christ Church college, Oxford, studied medicine, served as house surgeon to St. George's hospital, and from 1854 to 1863 as assistant surgeon to the life guards. He has devoted himself to investigations in natural history, especially in the department of fish culture. In 1858 he edited his father's Bridgewater treatise on geology and mineralogy. In 1859 he discovered the coffin of the great surgeon and physiologist John Hunter, whose remains were thereupon reinterred in Westminster abbey by the royal college of surgeons. Besides contributing many papers to various periodicals, he has written "The Curiosities of Natural History," three treatises, and a treatise on "Fish Hatching." He published at his own expense the "Museum Economic Fish Culture" in the royal horticultural gardens, in which are illustrated the modes of propagating fresh and salt water fish and oysters. For his labors in this department he received in 1866 a silver medal from the *Exposition de pêche et d'agriculture* at Arcachon, France, and in 1868 the diploma of honor from the Havre exhibition. In 1867 he was appointed inspector of salmon fisheries for England and Wales, and in 1870 special commissioner to inquire into the effects of recent legislation on the salmon fisheries of Scotland.

BUCKLE, Henry Thomas, an English author, born at Lee, Kent, Nov. 24, 1821, died in Damascus, Syria, May 29, 1862. He was educated at Dr. Halloway's school in Kentish Town. Upon the death of his father in 1840 he inherited a considerable fortune, which enabled him to devote himself exclusively to literary pursuits. He collected a large library, read continually, and made copious notes. He acquired some knowledge of many languages, among which were French, German, Italian, Spanish, Dutch, Russian, and Danish. His principal recreations were chess and whist, at which games he was one of the best players in Europe. His reputation rests upon his "History of Civilization in England," the first volume of which was published in 1857, and the second in 1861. These two volumes contain only a portion of the introduction to a comprehensive work which he had in mind. Their literary merits were at once recognized; but the theory on which they were based elicited much discussion. In tracing the causes of the progress which had been made in civilization, he endeavored to show that the character of a people was chiefly dependent on material circumstances, such as soil, climate, scenery, and food, and that ideas on morals or religion had very little influence on civilization, progress in which, he maintained, depended chiefly on the growth and accumulation of scientific or

positive knowledge. He left England in October, 1861, and passed the winter on the Nile with the view of recruiting his health. In March, 1862, he set out upon a tour through Sinai, Petra, and Palestine, during which his death was caused by an attack of fever. His "Miscellaneous and Posthumous Works," with a biographical sketch by Helen Taylor, appeared in 1872 (3 vols. 8vo, London).

BUCKMINSTER. I. Joseph, D. D., an American clergyman, born at Rutland, Mass., Oct. 14, 1751, died at Readsboro, Vt., June 10, 1812. He graduated at Yale college in 1790, as one of the three best scholars in his class, remained there three years upon the Berkeley foundation, studying theology, and was afterward for four years tutor in the college. In 1779 he became pastor of the North church at Portsmouth, N. H., where he remained 33 years, when his health became impaired, and he died while on a journey to the mountains of Vermont. He was remarkable for the fervor of his devotional exercises and the earnestness of his preaching. He was deeply interested in the controversy which during his later years made a wide division between the conservative and liberal Congregationalists. The change of views arrived at by his son Joseph Stevens Buckminster, and the discussions between the two, form one of the most interesting features in the memoirs of both. Although differing in creed, and conscientiously tenacious of his own opinions, he preached his son's ordination sermon. He published about 25 sermons, preached on different occasions between 1788 and 1811, and a brief memoir of the Rev. Dr. Mackintosh, and was one of the authors of the "Piscataqua River Prayer Book" for the use of families. His daughter, Mrs. Eliza Buckminster Lee, has published "Memoirs of the Rev. Joseph Buckminster, D. D., and of his son, the Rev. Joseph Stevens Buckminster" (Boston, 1851). **II. Joseph Stevens**, an American clergyman, son of the preceding, born at Portsmouth, N. H., May 26, 1784, died in Boston, June 9, 1812. He was educated at Exeter academy and at Harvard college, graduated in 1800, and became an assistant in Exeter academy, where he was one of the teachers of Daniel Webster. In 1804 he began to preach in the Brattle street church, Boston, of which he was ordained pastor, Jan. 30, 1804. He thus became minister of one of the largest and most intelligent religious societies in New England before he was 21 years of age. In 1806-'7, his health having become impaired, he travelled extensively in Europe, and while in England purchased many books for the Boston Athenæum. On his return he became an active member of the Anthology club, from which originated one of the first purely literary periodicals published in America. In 1808 he superintended the republication of Griesbach's New Testament, containing the most important various readings, and was afterward appointed lecturer on Biblical criticism

in the university at Cambridge. He was a member of the academy of arts and sciences, and of the Massachusetts historical society. A volume of his sermons, remarkable for purity of thought and finish of style, with a memoir of his life and character by S. C. Thatcher, was published in 1814, and a memoir of his father and himself by his sister in 1851. His works were published in two volumes in 1839. A quarter of a century after his death a monument was erected to his memory in the Mount Auburn cemetery.

BUCKS, an E. county of Pennsylvania, bordering on New Jersey, and bounded N. E. by the Delaware river, which is here navigable for steamboats; area, 600 sq. m.; pop. in 1870, 64,336. This was one of the three original counties founded in 1682 by William Penn. It possesses valuable quarries of limestone and sandstone; and iron, plumbago, titanium, and zircon are found in some localities. The northern part is hilly; the remainder of the surface is moderately uneven; the whole is in a high state of cultivation. The Philadelphia and Trenton, the North Pennsylvania, and the Doylestown railroads pass through the county. The chief productions in 1870 were 525,740 bushels of wheat, 94,095 of rye, 1,325,626 of Indian corn, 1,208,717 of oats, 372,979 of potatoes, 118,014 tons of hay, 125,479 lbs. of cheese, 2,861,557 of butter, and 151,872 of tobacco. There were 14,679 horses, 28,572 milch cows, 8,620 other cattle, 7,404 sheep, and 25,159 swine. Capital, Doylestown.

BUCKSPORT, a town of Hancock co., Me., on the E. bank of the Penobscot, just above Orphan island and the narrows, and 16 m. S. of Bangor; pop. in 1870, 3,433. During the war of 1812-'15 it was captured by the English. A large, substantial fort, built in 1846-'50, on the opposite bank, at a bend of the river, now commands the narrows and the river in both directions. The town is regularly laid out on a rising slope. Neat and tasteful houses, with overshadowing trees, give it a very pretty appearance from the river. As the Penobscot seldom freezes at this point, Bucksport becomes the winter harbor for Bangor vessels, as well as for its own commerce. There are two hotels, a savings bank, a national bank, four ship yards, and several manufacturing establishments; a Congregational and four Methodist churches, and a male and female seminary, with a library of 1,200 volumes, under the control of the Methodists.

BUCKSTONE, John Baldwin, an English actor and dramatist, born near London in 1802. At the age of 19 he began his career as an actor in the provincial towns, and in 1823 appeared at the Surrey theatre, London. He afterward played at the Adelphi, the Haymarket, Drury Lane, and the Lyceum, and gained great success in low comedy characters. In 1840 he visited the United States, and made his first appearance at the Park theatre, New York, in his own comedy of "Single Life." Returning

to England, he became lessee of the Haymarket theatre in 1852. He has written nearly 20 pieces for the stage, mostly comedies and farces. Among the best known are "Married Life," "Single Life," "Green Bushes," "Flowers of the Forest," "Rough Diamond," "Good for Nothing," "Irish Lion," "Alarming Sacrifice," and "Jack Sheppard."

BUCKTHORN, a plant of the genus *rhamnus*, of the order *rhamnaceæ*, comprising about 60 species, distinguished by its hermaphrodite or polygamo-dioecious flowers, 4 or 5-lobed calyx, the tube campanulate and lined with the disk; petals small or wanting, when present notched and wrapped around the stamens; ovary free, 2 to 4-celled; drupe berry-like, black when ripe, containing 2 to 4 seed-like nutlets, grooved on the back. Shrubs or trees, with alternate, rarely opposite leaves, petiolate, pinnate-veined, deciduous or evergreen; stipules



Buckthorn (*Rhamnus cathartica*).

small and deciduous; flowers axillary, racemose or cymose. The buckthorn (*R. cathartica*) is a native of Europe, and has been partly naturalized in the eastern states. As it is hardy as far north as New Hampshire, and bears the knife well, it is much used as a hedge plant, for which its thick short branches and stout spines well fit it. When growing free as a standard, the buckthorn attains a height of 12 or 15 feet. The flowers are of a greenish-yellow color. The juice of the unripe berry has the color of saffron, and when ripe, mixed with alum, the pigment known as sap green is produced. The bark affords a fine yellow dye. Medicinally the berries and inner bark are violently cathartic and purgative, and so strong are these qualities that they even affect the flesh of birds feeding upon the ripe berries. Plants are easily propagated from the seeds and grow with considerable rapidity. To make good hedges, however, it is necessary to keep them cut low for two or three years, and then if the longer free-growing shoots are intertwined with the older branches, a perfectly hardy and impenetrable hedge is procured in a few years. Among American species, *R. lanceolatus* and *R. alnifolius* are not uncommon, but neither is so easily managed as a hedge plant, nor are the berries so valuable as those of *R. cathartica*. In some species native to Siberia, the wood is reddish and exceedingly hard; the Mongols use it for their carved images. The wood is also used in the manufacture of charcoal for gunpowder.

BUCKWHEAT (*Polygonum fagopyrum*, Linn.), species of grain supposed to be a native of Persia, and called *blé sarrasin*, or Saracen wheat, by the French, after the Saracens or Moors, who are believed to have introduced it into Europe. It thrives on poor soils, comes rapidly to maturity, and is most frequently planted in cold countries that are not rich enough to support other crops. It is extremely sensitive to cold, being destroyed by the least frost, but it may be sown so late and reaped so early as to incur no danger from that source. Its flowering season continues for a long time, so that it is impossible for all the seeds to be in perfection when it is reaped, and the farmer must decide by careful observation at what period there is the greatest quantity of ripe seeds. Buckwheat does not exhaust the soil, and by its rapid growth and its shade it stifles weeds, prevents the soil from going to seed, and leaves the field clean for the next year. It is sometimes ploughed under the ground in a green state for manure. The seeds of buckwheat furnish a white flour, from which a popular gruel is made in Germany and Poland, and breakfast cakes in England and America. Cakes and a dark heavy bread



Buckwheat (*Polygonum fagopyrum*).

made from it also in the provinces of France, especially in Brittany. Its flowers secrete a large amount of honey, and are therefore always covered with bees; and in the middle of the United States it is often cultivated for their honey, but the honey is of inferior quality. The grain is superior to oats as nutriment for horses and poultry, and is especially efficacious in making the latter lay eggs. The green plant is said to greatly increase the milk of cows, according to Thaeer and Hauser it produces strength and a sort of intoxication in swine and sheep which feed largely upon it.—There is another kind of buckwheat, distinguished from the common by the sharper angles of its seeds and its tougher stocks. It is earlier and taller, more sensitive to cold, and produces grain in greater quantity, but of an inferior and bitter quality. It was introduced from Tartary into

Russia in the beginning of the 18th century, and it has thence been dispersed all over Europe. Hence its name of Siberian buckwheat, or *Polygonum Tartaricum*.

BUCQUOY, Jean Albert d'Archambaud, count and abbé de, a French writer, born in Champagne about 1650, died in November, 1740. He was by turns a soldier, a gallant, a churchman, a founder of seminaries, a teacher, a revolutionist, a skeptic, and a moral philosopher. He was imprisoned in the Bastille, but escaped (1709) and fled to Switzerland, thence to Holland, and then to Hanover, where he spent some time at the court of George I., who liked his wit and gave him a pension. His principal work, *Événements des plus rares*, &c. (1719), relates to his experiences in prison. He also wrote on politics, religion, and toward the close of his life on the malignity of women and on death. He figures in Gérard de Nerval's gallery of eccentric personages (*Les illuminés, ou les précurseurs du socialisme*, Paris, 1852).

BUCYRUS, a town and the capital of Crawford co., Ohio, on the Sandusky river, 60 m. N. of Columbus; pop. in 1870, 8,066. The Pittsburgh, Fort Wayne, and Chicago railroad passes through it. There are several churches, good schools, a bank, a number of manufactories, and two weekly newspapers. In the vicinity are mineral springs and a well of inflammable gas. In 1848 a specimen of the mastodon in good preservation was found near the town.

BUZACZ, a town of Austria, in eastern Galicia, 83 m. S. E. of Lemberg; pop. in 1869, 8,178. It has a gymnasium, which is conducted by the Basilian monks. On Oct. 18, 1872, a peace was concluded here between Turkey and Poland, in which the latter country ceded Podolia and the Ukraine.

BUDA (Ger. *Ofen*), the capital of Hungary, on the right bank of the Danube, in lat. 47° 30' N., lon. 19° 8' E., 133 m. E. S. E. of Vienna; pop. in 1870, 53,998, mostly Germans. On the opposite bank of the Danube, here 1,400 feet wide, is the larger city of Pesth, the two being connected by a suspension bridge and regular steam ferry boats. The two cities are sometimes spoken of as one, under the name of Buda-Pesth (Hun. *Budapest*), the joint population being more than 250,000. The German name Ofen, "oven" or "stove," was probably given to Buda on account of the hot springs in the neighborhood. Buda is the official residence of the emperor of Austria as king of Hungary, and the seat of the principal government offices of the kingdom, as distinguished from the other parts of the Austrian empire. The city, about 9 m. in circuit, is built around the Schlossberg, an isolated shelving rock, crowned by a castle built in 1748 by the empress Maria Theresa from the ruins of an old fortress. The Schlossberg is the finest part of the city, and is surrounded by walls, from which the suburbs extend toward the river. The principal buildings on the Schlossberg are the royal palace, a quadrangular structure 564

ft. in length, containing 208 apartments, partially destroyed during the bombardment of 1849, but since restored; and the Gothic parish church, built in the 13th century, but much modernized; during the Turkish supremacy it was converted into a mosque, and afterward into a stable. In this church the emperor Francis Joseph was crowned king of Hungary in 1867; adjoining the church are the government offices, treasury, and the palaces of several of the ministers. In the centre of the palace square is the Hentzi memorial, a Gothic cross erected to the memory of Hentzi, the Austrian commander of Buda, who with 418 comrades, whose names are inscribed upon the monument, fell in the siege of 1849. In an adjacent chapel are preserved the Hungarian regalia, consisting of the sword, crown, sceptre, and mantle of St. Stephen. The crown, or

rather its original part, was sent to St. Stephen by Pope Sylvester II. in the year 1000, the time of the establishment of Christianity in Hungary, and is called "the holy and apostolical crown." It was always most sedulously guarded, and only exhibited in public for three days preceding the crowning of a sovereign; and when taken to Presburg for the coronation it was placed in an iron case, sealed with the royal seal. It was carried off by Kossuth to Debreczin in 1849, after the surrender of Világos hidden in the ground near Orsova, on the Turkish frontier, and not recovered till 1853. Beyond the Schlossberg is the Blocksberg, a still higher hill, formerly surmounted by an observatory, and now by a fort which commands both Buda and Pesth. From the Blocksberg and other eminences in the neighborhood the walled and then strongly fortified



Buda.

portion of Buda was shelled by Görgey in 1849. A tunnel connects the Schlossberg and the Blocksberg. There are in Buda 12 Roman Catholic churches, a Greek church, a synagogue, several monasteries and convents, a theatre, and important military, educational, and benevolent institutions. The principal trade is in red wines produced in the neighborhood. There are cannon foundries, ship yards in which many of the steamers navigating the Danube are built, and some manufactories of silk, velvet, cotton, woollen, and leather. In the suburbs, especially at the foot of the Blocksberg, are numerous hot springs, with remains of Roman and Turkish baths. The most famous of these springs are those of the "Emperor's Baths," adjoining Old-Buda (Hun. *O-Buda*; Ger. *Alt-Ofen*), a suburban place, which is supposed to occupy the site of the Aquincum of the Romans (pop. in 1870, 16,002).

The suspension bridge over the Danube has taken the place of a bridge of boats. The width of the central waterway is 627 ft., and from centre to centre of the towers 677 ft., exceeding by 117 ft. that between corresponding points in the Menai chain bridge; each of the side openings is 271 ft. wide; the towers rise 117 ft. above water level. The bridge, begun in 1840, cost more than \$3,000,000. It was first opened Jan. 5, 1849, to give passage for the Hungarian army under Görgey in its retreat.—The earliest part of modern Buda was built in the 13th century. It was the residence of the Hungarian kings; was taken by the Turks under Solymán the Magnificent in 1526, but recovered in the following year; was regained by the Turks in 1529, and retaken by Charles of Lorraine in 1686, after a protracted and memorable siege; and in 1784 was again made the seat of the Hungarian government. The

of the many sieges of Buda took place in 1849, when the Hungarians under Görgey took it by assault. (See PESTH.)

BUDÆUS. See **BUDÉ.**

BUDAYOON, or **Budæon**, a town of British India, capital of a district of the same name, in Mircund, 125 m. E. S. E. of Delhi; pop. 20,000. It was occupied by the sepoy mutineers, and a body of liberated prisoners from Bareilly, in 1857. The Europeans escaped by flight. Whitelock captured the town April 19, 1858, after an engagement in which the sepoys lost 500 men and 4 guns.

BUDDEUS (originally **Budde**). **I. Johann**, a German theologian, born at Anklam, Dec. 25, 1667, died at Gotha, Nov. 19, 1729. He was a descendant of the French scholar Budé or Budæus. In 1689 he became adjunct professor of theology at Wittenberg, in 1693 professor of moral philosophy at Halle, in 1705 professor of theology at Jena, and in 1713 church councillor at Gotha. As a theologian he endeavored to harmonize conflicting opinions. He was a voluminous writer, and among his principal works are: *Historia Juris Naturalis, et Synopsis Juris Naturæ et Gentium* (Halle, 1695); *Institutiones Theologiæ Moralis* (Leipsic, 1711); *Historia Ecclesiastica Veteris Testamenti* (Halle, 1709); and *Institutiones Theologiæ Dogmaticæ* (Leipsic, 1728). **II. Augustus**, a German traveller and author, a descendant of the preceding, born at Altenburg in 1817. He studied medicine, travelled over a great part of Europe, and became one of the editors of the Augsburg *Allgemeine Zeitung*. He has published several works upon Russia, among which are: *St. Petersburg im kranken Alter* (Stuttgart, 1846); *Halbrussisches* (Leipsic, 1847); *Russland unter Alexander II.* (Leipsic, 1850); and *Russlands sociale Gegenwart und ihr Aufstand in Polen* (Leipsic, 1853). He has also written *Schweizerland* (Leipsic, 1853); *Europäische Chronik*, 1855 (5 vols., Frankfurt, 1855-6); and *Europäisches Jahrbuch*, 1856 (Gotha, 1857).

BUDDHISM and **BUDDHA**, an Asiatic religion and its founder. Buddha (the learned, wise, intelligent; perf. pass. participle from *budh*, to know, to understand, to be awake) is the general name for a deified teacher of the Bauddhās, whom we call Buddhists. These hold that innumerable Buddhas have appeared to save the world, among them one of the present period, so known as Sākyamuni, or Saint Sākya, who is believed by some to have been the ninth incarnation of Vishnu. He was a reformer of Brahmanism, introducing a simple creed, and substituting a mild and humane code of moral laws for its cruel laws and usages. His history is to a great extent legendary, and is divided into sections, viz.: 1. While in the fourth heaven he determines to save the world, and chooses to be born as the son of Suddhodana, king of Kāvastu, and of Māyā, yet a virgin; both of the Sākya genus of the Kshattriya caste, and a branch of the Ikshvākus, who were of the race

of the sun, kings of Ayodhya (Oude), or even descended from Mahāsammata, the first of all kings of the present period. 2. He descends from heaven as a white elephant; is conceived as a five-colored ray of light. 3. He is born, amid great miracles, through the right side, and as soon as born solemnly proclaims his mission. 4. He is named Sarvārthasiddha (*sarva*, all; *artha*, wish, request; *siddha*, fulfilled); his mother dies on the seventh day after his birth; he is cared for by her sister, Prajāpati Gautami (*prajā*, world, people; *pati*, master; *gautami*, a female of the Gotama race), of the Brahmanic, Gotama genus; hence he is called Gautama. 5. He chooses Gopā, also a Sākya, for his bride, and obtains her after having shown his prowess in a public game, and his great learning and skill in arts. 6. After meditating on the vanity of enjoyments, he leaves his father's house and becomes a most austere ascetic and hermit. 7. He performs the most rigid penances, goes to the Bodhimanda or throne of intelligence at Gāya, and sits under the Bodhidruma, or *figus religiosa* (banian), where every Bodhisattva (intelligence of truth) becomes a Buddha. 8. He is tempted by Māra (*mari*, to die), the god of love, sin, and death; but withstands his enchantments and terrors. 9. He recollects all his previous births and those of all beings, attains thus to *Bodhi* (intelligence), and shines forth as the Buddha, "the awakened, intelligent, knowing" (Chinese, *Fo* *thu* or *Fo*, also translated *Kio*, the enlightened; Thibetan, *Sangs rgyas*; Mongol, *Burtchan*; Japanese, *Budodo*; the number of his names is 12,000 in Ceylon, and in a Thibetan tract 5,458). All beings become aware of his arri-



A modern Idol representing Buddha.

val, and two merchants from far-off lands are the first mortals who see him, offering him honey, milk, &c. 10. He "turns the wheel

of faith," or becomes a teacher, "unfurls the victorious banner of the good law," and proceeds to Varānāsi, now Benares, on the Ganges; there he finds his five former pupils, and though he preaches in the Magadhi language he is understood by all hearers of different tongues. Many other fanciful stories and many philosophic speculations have been interpolated amid the facts in the history of Buddha, especially in the 45 years of his sacerdotal functions. The scene of his priestly life is placed by some in the Deccan, by others in Ceylon, and by others in the Punjab, and even beyond the Indus; although, as a matter of fact, it seems to have been restricted within Oude and South and North Bahar, extending probably to the boundary of Bengal and into the Doab and Rohilkund. Many sculptures not far from modern Gāya, and other monuments at and near Patna, bear witness to the reality of the reformer's existence. When he appears to discharge his mission, men and women of all classes and ages flock around him. Most of the rulers become converts together with their subjects. Srāvastī (the city of hearing), on the northern bank of the Ganges, became a rival of Gāya. There Anāthapindika built a magnificent monastery, from which most of the Buddhist holy books are dated. Here Sākya-muni appoints his pupils as apostles, and performs many miracles. At first he is adverse to the admission of women to ecclesiastical life, but afterward chooses some as his agents. He is also named Sramana (*sram*, to be wearied), or the unchangeable, and is soon opposed by Brahmans and others, especially for admitting the impure and outcast to the privileges of religious asceticism. He humbles the six Tirthakas, or sectarian philosophers and visitors of sacred ponds, whose lucrative occupation is ruined by the new doctrine. Calumny, conspiracies, and snares, all tricks of Māra, are unavailing against him. 11. His native city, with all his kindred, is cruelly destroyed by a king of Kosala shortly before his death in the 80th year of his age. This causes great convulsions of nature. King Asoka raised on the spot where he died a *stūpa* or mound with a column to his memory. 12. When his body is about to be burnt, the pile cannot be kindled; but after Kāśyapa has honored the feet of the dead, the "flame of contemplation" breaks out of the breast and consumes the corpse. The pearly, heaven-scented pieces of his bones, which have defied the fire, almost cause a war for their possession, but are at last divided among seven competitors, who erect *stūpas* over them.—Even if an actual personal existence be denied to Sākya-muni, the religious reform itself must be admitted as a fact. Among the Buddhist nations there is a difference of about 2,000 years as to the date of his death. As the skilfully contrived story of 38 Buddhist patriarchs in uninterrupted succession is now exploded, we prefer the Cingalese date of 543 B. C. Brahmanism had become intolerable. Sākya-muni

rejects the Brahma, the authority of the Vedas, the sacrifices, and all Brahmanic rites. Even popular Buddhism in adopting the Brahmanic gods degrades them below Buddha, even below the Arhats (*arh*, to worship) or venerable priests, thus raising men above the gods. Buddha, a man, and not an incarnation of a high being, is self-perfected. In the Vedas also holiness, piety, meditation, and wisdom are mightier than all gods. Indian virtue, more passive than active, consists in self-sacrifice, in the taming of sensuality and of one's own will, in sympathy with all beings. As soon as sin is uprooted, infinite knowledge opens.—Originally, Buddhism was simple, ethical, and rational; and hence hostile to mythology, scholasticism, ceremonies, and priestcraft. It was benevolent and humane in the highest degree. It improved upon the Sāṅkhya philosophy, and rendered it popular and practical. It called all men to its fold, without any distinction of quality or position, opening to all the way of salvation, which it teaches to be attainable by purity of conduct. Castes, however, were not directly prohibited but ignored, so that they exist to this day in Ceylon, the great southern stronghold of Buddhism. "I am a *bhikkhu*" (beggar), says Sākya-muni, without Brahmanic pride. "There is but one law for all: severe punishment for crime, and great reward for virtue." "My law is one of grace for all; like heaven, affording room for men and women, for boys and girls, for rich and poor." "It is difficult to be rich and learn the way." In a legend all lamps kindled in honor of Buddha ceased burning, except one offered by a poor woman. Ananda, his favorite disciple, drinks water drawn from a well by a Chandali. Sākya-muni spoke to the people in parables under the free sky, united the scattered anchorites into communities, orders, and monasteries, some for men, some for women, also allowing persons of both sexes to be lay members without vowing chastity and mendicacy. The clergy were made the foundation of Buddhist society, whereas in other creeds the laity are the basis on which the hierarchy reposes.—The first period of Buddhism, from Sākya-muni to its recognition as a sort of state religion in the great Prācīna or Prāsian empire and beyond Hindostan, comprehends the fixation of the dogmas, its first schisms, and œcumenic councils. Kāśyapa, the principal disciple of Sākya-muni, held the first council of 500 Arhats at Rājagriha, establishing the Vinaya (*vī*, before; *nī*, to conduct) or discipline based upon the Sūtras (*sū*, to sew; *tra*) or apophthegms and sermons of Buddha. Disorders in the great monastery at Vaiśālī called for a second council in that city during the reign of the king Kālāsoka, a great protector of the faith, about 100 years after the death of Sākya. The history of Buddhism at that time is enveloped in the greatest darkness. Among about 18 sects two are prominent, viz., the Vaibhāshika (*vī*, apart, asunder; *bhāṣā*, to declare; suf. *ika*), or dilemmists, with

subdivisions; the Sautrāntika (*sūtra antika*, near), or close observers of the al maxims.—Alexander's invasion of the sub gave a great impulse to the spread of him. The Nanda dynasty of Magadha in Bahar was overthrown by the miraculous dragupta, or Sandrakottus, who freed the sub from Macedonian rule, received Megasthenes at his court in Pataliputra, and united India under his sceptre. Through his origin Sūdra, and through the Macedonian invasion he broke the power of the Brahmans. Chandragupta, the greatest king of Maurya dynasty, extended the empire, and, miraculously converted, became from a tyrant the most pious observer and the zealous propagator of Buddhism. Under name of Piyadāsi (love-gifted, pious) he issued most humane edicts, many of which are found engraved on columns at Delhi and Allahabad, and on rocks near Peshawar, in Orissa, &c., not in Sanskrit, the language of the Brahmans, but in Prakrit or other dialects. These edicts inculcate the value of virtues, order the construction of roads and hospitals, and even abolish capital punishment. The third great council was held at the command of Piyadāsi at Pataliputra, where 800 Arhats tried to cure the great anarchy existing in the church by sectarians and false and licentious monks. At the conclusion of the council an earthquake is said to have approved the decrees. Scarcely any book which passes the word of Buddha is prior to this council in which the decrees of the preceding councils were modified; indeed, it may be doubted whether any such book reaches even so far back. The creed was introduced into Ceylon the third year after the third council, where it was preserved for a century merely by oral tradition. In less trustworthy quarters than the Palaese there are manifest contradictions; the Nepalese believing that Sākyamuni wrote the books, while the Chinese derive the canon from the first council, and the Tibetans say the Tripitaka (three baskets) were written centuries after the third council. In preparation of the canon, Sanskrit was probably used along with other vernacular tongues by the disciples. The books of Ceylon, Burmah, and Siam are translated from the Pāli, a form of writing of Magadhi, a dialect of the Sanskrit. The code of the fourth council, held in Cashmere, is in Sanskrit. Unlike the Brahmans, who thought the Pariaians unworthy of their holy religion, the Pariaians or elders of the third council had sent apostles to preach in foreign lands, who converted the Nāgas (snake worshippers) and other idolatrous tribes of Cashmere; the Himalayas (snow mountain), lower Cabool, Gāndhāra (now Candahar), Yavana (from *Yavia*, probably Asia Minor, Ionia, and the satrapies of Alexander), Ujjāna (now Kafiristan) also received apostles. The Deccan, and even Pegu and Burmah are not forgotten, although the creed was carried thither much later from Ceylon. Bud-

dhisim carried the elements of Indian civilization to many a savage tribe, broke up many a cruel custom, and became a blessing to the greater portion of Asia. But in time the great Buddhist body was split, by its own extension, into a southern church, whose chief seat is in Deva Lanka, the divine island, or Ceylon, where it has been least altered from its ancient condition, and whence during more than five centuries it was propagated, even to further India; and a northern church, divided into many important branches, owing to the great number of nations that profess it; the Nepalese branch being less divergent from the ancient faith than those of Tartary, Mongolia, Thibet, China, and Japan.—In Hindostan, the primitive character of Buddhism was greatly impaired by its long and bloody contest, as well as its mixture with Brahmanism, and especially with the sanguinary tenets of Sivaism; and it finally degenerated into a medley of incongruous creeds. About the beginning of our era a new school or sect, called Mahāyāna (great passage), was added to the older Hinayāna (little passage) by Nāgarjuna, a celebrated Sthavira; and another in the 6th century of our era, called Yoga-chāra (*yoga*, junction and magic; *char*, to go), or Tantra, a sort of Sivaistic mysticism, by the Bhikshu Asanga. Even in Ceylon heretical tenets were inserted in the code of the Tripitaka by the learned Buddha Ghoska at the commencement of the 5th Christian century.—Among the Greek and Roman writers who have more or less imperfectly dwelt upon the men and affairs of India, Herodotus (books i. and iv.) names the Budini; Megasthenes, though residing at Palibothra, does not speak of the Buddhists, although (about 300 B. C.) he gives a full account of the five rivers of Pentapotamia, and describes Indian manners; Strabo speaks of two religious systems in India (book xv. of his geography), that of Brahma and that of the Garmans (apparently the Sarmatians, a sort of saints, probably Buddhists); Arrian mentions a Budias as third king of India; Clement of Alexandria speaks of a deified Butta; Victorinus and St. Jerome, of a Buddhas; Cedrenus and Suidas, of Budas. Clement and Jerome call that personage a gymnosophist, meaning probably the Jainas, a sect, which worshipped naked idols, and whose chief priests were naked.—The Jesuits have endeavored to prove Buddhism to be of Nestorian origin; but the Nestorians sought the protection of the Sassanidæ in Persia, and came into central Asia after their expulsion from the Byzantine empire, as late as the 5th Christian century. It is more probable that Buddhism had an influence on western creeds, as, for instance, on the Gnostics.—Buddhism was introduced into China by two ways, namely: in the south by sea, 65 B. C., and in the north through Khoten, over the great wall, into Shensi, in the 5th century. From Corea, where it existed about A. D. 370, it was brought into Japan about 550, to the court of

the dairi. Some writers assert that it entered that country as early as A. D. 60. From Ceylon it found its way into Aracan, Burmah, and Pegu (then a mighty empire, A. D. 897), Siam, Laos, Anam, Cochin China, and Tonquin. From Nepaul, where there is a very rich Buddhistic literature, the creed came into Thibet and Mongolia, the Mongol emperors of Hindostan having instituted a patriarchate. In Thibet, great dignitaries, called (about 1480) dalai-lamas (sea priests), pretended to be personified Bodhisattvas. Many Calmuck and other tribes of Tartary and Siberia also adopted this religion, and its influence is even perceived in Swedish Lapland. Its priests bear different names, as talapoins (umbrella-bearers) in Siam, bonzes in Japan, rahanes in Mongolia, &c.; they are dressed in yellow gowns, shave their heads, and go about bareheaded. The total number of Buddhists is about 800,000,000. In all Buddhistic countries there is a profusion of temples, monasteries, *stūpas*, *dhagobas* (pillars and mounds containing relics of Buddha), and other monuments overloaded with statues and sculptures of deities in grotesque forms. Among the great number of ancient grottoes containing temples and cells hewn in rock, many of them also containing monuments of Brahmanic worship, we may mention those on the islands of Salsette and Elephanta, those at or near Dhumnar, Carlee, Nassuck, Ayanti, and those most magnificent specimens at Ellora. Ceylon boasts of its Lova Maha Paya, with 1,600 pillars; of its mountain temples at Mehentele, grottoes and temples at Dambulu-galle, &c. Most of them are in ruins caused by time or by Portuguese devastation. Of the many battles of the Buddhists with the Brahmins in India, few turned out favorably for the former, one of their victories only (A. D. 478) being worthy of record. Although Buddhism was most ruthlessly overthrown during a contest which lasted for 15 centuries, still some of its traces remain in Hindostan. In the 4th century, Fa-hian witnessed its decadence, and with other Chinese pilgrims, especially Huan-Thsang (629-'45), recorded what remained of it and its monuments.—Having thus narrated the history of Buddhism, we now come to a summary of its doctrines, and of their principal ramifications. First of all, Buddhism maintains the vacuity, unreality, and illusiveness of nature. Naught is everywhere and always, and is full of illusion. This very nihilism levels all barriers between castes, nationalities, and conditions of worldly fortune, embracing even the vilest worm in the brotherhood of Buddhism. "All compounds are perishable," is the last sentence which Sākya-muni is believed to have uttered. The final object is Moksha, Nirvāna, or the deliverance of the soul from all pain and illusion. The endless round of metempsychosis is broken, by preventing the soul from being born again. This is attained by purification from even the desire of existence. These fundamental traits of

Buddhism are plainly comprehended in the most ancient positive dogma, which is contained in the four *Aryāni Satyānis*, the sublime truths attributed to Sākya-muni in his sermon in the gazelle grove near Benares. These four truths relate to pain, its origin, annihilation, and the way leading to liberation. "Pain is birth, age, disease, death, the meeting with what one dislikes, the separation from what one loves, the failure to obtain what one strives for. The causes of pain are the desires, lusts, passions. Annihilation of all these causes is the third truth. The way of annihilation again has eight parts: right view, right sense, right speech, right action, right position, right energy, right memory, and right meditation. Such is the 'fourfold way of faith,' found upon many monuments, as well as in many books. The essence of Buddhist morality is 'to eschew everything bad, to perform everything good, to tame one's thoughts.'" As the doctrine of Mohammed, succinctly called *al-Islamu* (obedience to the precepts of the apostle), so the precepts of Sākya-muni are named the "Way" (*Goti*), the "Way of the four truths." To teach "to turn the wheel of faith." The general law of Buddha Sākya-muni was contained in these four truths, and was altogether moral and practical. All the mythology, sacrifices, penances, hierarchy, scholasticism, mysticism, which we find connected with it, have been superadded in progress of time, in different countries, and under manifold circumstances. This mixed Buddhism, as depicted in the above-mentioned Hinayāna, comprehends three sections, the Dharma, Vinaya, and Abhidharma. We will give an account of each in its order. I. THE DHARMA (virtue, duty, law, from *dhrī*, to support) comprehends revelation, the dogmas, and their precepts, and in a strict sense, cosmology and cosmography, mythology, metempsychosis, and the theory of salvation. Buddhism knows of no creation. "The worlds are, from the beginning, in a continual revolution of arising and of perishing." Succession is the only reality, everything else being a process and progress becoming in the concatenation of cause and effect. This rotation has no cause, hence no beginning. It is not within the domain of intellect to know whence all entities come, whither they go. Four things are immeasurable, viz.: the science of Buddha, space, the number of breathing beings, and that of worlds. A Buddha alone can conceive the worlds. It is heresy to believe the worlds limited or illimited, or neither limited nor illimited. Mount Sumeru is the centre of the world, as deep as the ocean as it is high above its level. The ocean is enclosed by a girdle of rocks with six other concentric oceans with similar girdles, which decrease toward the periphery of the oceans in breadth, the rocks in height, in the progression of 84, 42, 21, 10½, 5½, 2½, 1½, the sands of *yojanas* (about five miles each). T.

ole stands again in the genuine ocean known men, in which are the four islands with 500 ts each. The southern island, or India, is angular, with men of trigonic face, living 0 years, 8 yards high; the eastern, semi- ular, with men of semilunar face, living 0 years, 8 yards high; the western circular, h round-faced men, living 500 years, 16 ds high; while the northern island is quad- ngular, containing the happy square-faced perboreans, who live 1,000 years, and mea- e 32 yards. Chakravāla (*chakra*, region; , to encompass), or an iron wall of 8,610, -) yojanas, near which the sea is very shal- w, surrounds the above-described group. ch such universe has its own sun, moon, stars, d hell. The Meru is like an index of a dial, ading each island, and thus producing night. ove the Meru rise the heavens in the follow- r order: 1. *Deva lokas*, or heavens of the la, six in number, forming with the earth e *Kāma dhātu* or lust principle. 2. Above the *Rūpa dhātu* or form principle, with ur *Dhyānas* (divine and clear contempla- ns), of which the first has three heavens for e Brahmas and their servants; the second ree for the gods of light; the third three of rity; the fourth seven of merits, exemption m pain, beauty, &c. 3. Still higher is *Arūpa- ātu*, or formless and colorless principle, with ur heavens, viz.: one of illimited space, one of illimited knowledge, one of naught, and the ured of neither thinking nor not thinking. mong the extreme heavens, the lowest in posi- on and majesty is that of the *Chatur mahārāja iyikas* (*quatuor magnorum regum comitum*), kings of demons, a sort of magnates guard- g the higher heavens. The second, *Traya- āmsas* (*triginta trium*), belongs to Indra, ho is the highest Buddhist god. The 26th, e *Nairasānjnāndsānjnāyatanaṃ* (*nec velut noscentium nec non cognoscentium*), or the th and highest heaven of all, affords a life of 1,000 great kalpas or periods from the origin one world to the beginning of another. The urth Dhyāna, referred to above, comprises 1,000 Dhyānas of the third kind, or 1,000 mil- ns of worlds of lust, with 1,000 millions of st Dhyānas and 5,000,000 of the second; the hole forming one great chiliocosm, or 1,000 orlds. Again, 1,000 great chiliocosms, as any as perish at each revolution, form a Bud- na territory, or system of a single Buddha. ith the northern Buddhists "3,000 great iliocosms" is a stereotyped phrase. Twenty eat chiliocosms, piled one above the other, rest on a lotus flower, of which an infinite num- r blossom in the "sea of aromas," each bear- g 20,000 millions of worlds. The number of ese aromatic seas is again 10 times as great the number which we would write with a unit followed by 4,456,488 zeros," and which ould extend, in common print, in a line of 4,000 feet. The above-named three groups of orlds and heavens are peopled everywhere by ntities of six *Gatis* (goings or ways of re-

birth), of which the first two are good and the last four bad, viz.: 1. The way of the Devas, or gods, who, although unavowed by Buddha, have been adopted by his followers. The gods dwell in the 26 or 28 heavens, and are named accordingly; the four great kings, the thirty-three, the not fighting, the joyful, the change-enjoying, the changing others arbitrarily, the assembled Brahmas, the servants of Brahmā, the great Brahmas; the gods of limited light, of illimited light, of pure light; of limited purity, illimited purity, perfect purity; of great merits, the unconscious, the not great, the exempt from pain, the well-seeing, the beautiful, the highest; illimited space, illimited science, the place of naught, that of no-thought, and not no-thought. 2. The way of men. 3. That of the Asuras, or most powerful bad genii, of monstrous shapes. 4. That of unreasoning animals, divided into footless bipeds, quadrupeds, multipeds. 5. That of Pretas, goblins, monsters of hunger and thirst, giants, moving skeletons, fire-eaters, vampires, &c. 6. The denizens of hell, placed originally in four, later in eight, at last in 186 hells of all degrees, from a sort of limbo or purgatory to the *Lokāntarika Naraka*, or intermediate hell, destined for skeptics, who are the greatest of all sinners. These hells are of Brahmanic invention.—As seed and plant, or egg and bird, contain and follow one another in an endless series, so is it with worlds. Innumerable worlds have thus appeared and disappeared. This chapter of world-renewals is the most contradictory and incomplete in popular Buddhism, because it grew up by agglomerating the fantastic notions of many peoples around the nucleus of the purer doctrine. A Kalpa is a period of destruction and reconstruction, and a *Mahākalpa* or great Kalpa, as we have said, is that from the origin of a world to the beginning of a new one; it is subdivided into four *Asankhya kalpas* or incalculable Kalpas, viz.: of destruction, interval, renewal, stability; each again into 20 Antara or intermediate Kalpas. If it should rain incessantly during three years on the whole globe, the number of the fallen drops would not equal that of the years of one Asankhya. Each destruction is announced 100,000 years in advance by a Deva, calling on all beings to avoid sin, to repent, &c. Monsters and many of the damned are reborn as men; the denizens of the lower heavens and men rise higher. At the appointed time a great cloud rains for the last time; then everything dries up; lower beings are advanced, and only skeptics and infidels are reborn into the Lokantantatika. The dross of nature is now annihilated; a second and a third sun dry up all flowing waters; a fourth and fifth dry up the ocean; a sixth heats the earth up to the seat of Indra; the seventh at last kindles it to a flame, which consumes the world to less than ashes, up to the heavens of the Brahmas inclusively. The liquid destruction by caustic waters is somewhat analogous, and reaches beyond the second Dhyāna. Wind destroys still high-

er up the whole third Dhyāna. The scheme of the intensity of the destructions is: the first, third, and fifth are moderate; the second and sixth are middling; the fourth is great. The world preceding the present was greatly destroyed. In short, there is a whole minute tariff of the medium, degree, and extent of world-destructions. The fourth Dhyāna forms the limit of destruction, it being, together with the higher heavens, a reservoir for the reconstruction of the universe. The Kalpa of emptiness is a dark vacuum below the preserved heavens, existing during 20 intermediate Kalpas; after which a wind from the 10 quarters begins to blow; then a cloud gathers; rain, contained by the wind as in a vessel, fills the vacuum up to the reservoir; then all beings are reproduced by the churning action of the wind; first the annihilated Dhyānas, then the lower regions, the "throne of intelligence," and the Bodhi tree, near Buddha-Gāya (*gai*, to sing), and the lotus, whose number of blossoms is emblematic of that of the Buddhas (originally five, afterward 1,000) in the future Kalpas. Many of the beings preserved in the higher heavens are reborn on the new earth, with bodies shining like the sun, and live by meditation. After having tasted of the sweet new earth-sap, their bodies begin to ferment with lusts, to have need of the sun and moon (which only then shine forth), and they deteriorate in the ratio of their appetites. Their nutriments grow coarser, and excite sexual desires, which beget the necessities of birth and other evils. The greedy accumulate too much rice, which ceases to grow spontaneously; agriculture therefore becomes imperative. Then "mine and thine," or ownership, are contrived; followed by laziness, gluttony, dissipation, envy, avarice, theft, murder, war, &c. Therefore Mahāsammata (the great assented to) was chosen as the first king on earth; and castes followed. The duration of life sank with the deterioration of beings to 80,000 years; many are reborn as animals, and at last hell yawns. After this follows the Kalpa of stability. In it the life of men lasts only 10 years, then 80,000, and thus gradually and alternatively 20 times, in the ratio of sinfulness. In this the most majestic and perfect Buddhas are born, for the renewal of the Dharma. A Kalpa with five Buddhas is called Bhadra (prosperous, virtuous), and such is the present one, which is in its decline. Deterioration by sin is cured by wars, pestilence, hunger, scourges, which arouse the survivors to better conduct.—The world is governed by destiny. This differs from the Greek *μοιρα*, the Latin *fatum*, and the *maniyat* of the Islam; nor is it a law of nature, or an eternal decree, or predestination. According to the Buddhists, living beings are by no means products of nature. Only because the entities have sinned from eternity or become material, matter exists; because they are from eternity in the process of purification, the innumerable worlds arise and vanish. The entities are the

marrow, the universe is its lodging. In short, the universe is a result of the morality of breathing beings, and destiny is the product of the merit and guilt. There is no indivisible absolute being, as the germ of nature. The carnal point of the rotations of the worlds lies in the lowest stations of the fourth Dhyāna, viz. in the two heavens of the gods of great merit and of the unconscious, which form the line of demarcation between sin and sinlessness. Morality is the prime agent of that whirlwind which tosses the universe into being and non-being. The mode of its action is variously explained. Beings migrate, because they are sinful, by having fallen through terrestrial nourishment into avarice, hatred, &c., in consequence of unatoned guilt in former lives. Buddhism makes no inquiry into the origin of individual entities. *Samsāra* (*san*, Lat. *simul*, and *eri*, go), or mundane life, is the fundamental element of the ocean of existence with the four poisonous streams, birth, age, disease, and death, upon which we are tossed by the storm of passions, restless and without haven. Out of the *Samsāra* there is naught; on the one hand there is emptiness, and on the other Nirvāna, or beatific franchisement. In *Samsāra* there is no truth, no essence; all is deceit and fallacy. It is constant in inconstancy; in it every form of determination breaks like a bubble. Birth leads to death, death to rebirth, youth to old age, beauty, health, wealth, vanish. All ages beset by peculiar evils. Death is not the end of pains, for it leads to birth again. Sin grades to a lower being or leads into hell. Even godliness does not exempt from rebirth, or from relapse into a bad *Gati* (way) of birth.—With regard to ontology and psychology, the philosophic schools of Buddhism differ at variance, and especially concerning the relations of the soul and of the Nirvāna. In some cases the soul of man may sink even below six *Gatis* or ways of rebirth into the vegetable and mineral way; although this view is supported by the more ancient texts than the Brahmanic or Thibetan legends. *Klesa* (to suffer or inflict pain), or the original sin of a former existence, is the fountain of all evil. Its conquest is the last aim of all life and effort. He who breaks its fetters, "breaks through the eggshell" and escapes the alternation of births. The *Klesa* awakens evil desires, which are chains to existence; this clinging to impels us to a renewal of existence, and further wandering after death; the love of life begets new life. Both this motive and the so-called destiny by morality have their root in the *Klesa*: the former acting as impulse, gravitation into corporeality; the latter as germ; leading to the realization of the form. With the death of the body the soul is freed from its desires, but wanders by the *Gati* which it deserves. All good and bad deeds are balanced against each other like credit and debit in a commercial account, and determine individual destiny, not provide

tially, but in consequence of the endless chain of causes and effects. Only a Buddha or an Archcha (*arch*, to worship) or saint can overlook and unravel the thousandfold knotted threads of the moral chain. Buddha said once to Ananda: "If a well-doer comes to hell, the merit of his present life is not yet matured, but the evil of a former. To be rewarded before such maturity would be tantamount to being paid before the appointed term." Freedom is obtained only after the escape from the bonds of desires, and from the power of our past deeds. Then only do we see, with a "divine eye," our numberless births, risings, and fallings, which are all due to our actions. The succession of the existences of a determinate being is also a succession of souls, which are united by the law of moral causality, each one being the product of the guilt or merit of all its predecessors. When an individual dies, the body is broken, the soul is extinguished, leaving merely its deeds with their consequences, as a germ of a new individual. According to the germinating power, determined by the Karman (morality of actions), the result is an animal, or a man, or a demon, or a god. Identity of souls is thus replaced by their continuity, in the solution of the moral problem. Each soul inherits the fruits of the Karman, and the office of liberating and purifying its predecessor. I ought, therefore, not to act well merely on behalf of my own selfish weal, but for the benefit of a new "I," which is to follow after me. The Buddhist metempsychosis is, therefore, rather a metamorphosis of the soul. "A lamp is lighted from another; the lamps differ, the second only receiving the light from the first. So is it also in regard to souls."—The final goal of Buddhist salvation is the uprooting of sin, by exhausting existence, by impeding its continuance; in short, by passing out of the Sansāra into the Nirvāna. The significance of the latter term is a prolific subject of discussion and speculation with the different philosophic schools and religious sects of Buddhist Asia. Its interpreters prefer vague definitions, from fear of offending sectarians. It means the highest enfranchisement; to theists, the absorption of individual life in God; to atheists, in naught. The Tibetans translate it by *Mya-ngan-los-hdah-ba*, the condition of one freed from pain; eternal salvation, or freedom from transmigration. Its etyma are: *nir*, not; *vā*, to blow; suffix *ana*; its orthography is also *Nirvāna*; its collaterals are: *Nirvānamastaka*, liberation; *nirvāpa*, putting out, as a fire, &c. It is *Nibbāna* in Pali, *Nibān* in Burmese, *Niruphan* in Siamese, *Nipān* in Chinese. Weighing all divergences in its exegesis, it may be safely designated as the definitive enfranchisement from existence without a new birth, the cessation from all misery. It is the beyond of the Sansāra, its contradiction; without space, time, or force. In the third council it was declared to be ineffable and indescribable. Life being the *summum*

malum, its annihilation is the *summum bonum*. The common definition is "total annihilation of pains and of the *Skandhas* or attributes of existence." But this "beatifying dogma of naught" became with the laity a mere emancipation from suffering and cessation of existence. By dint of Dhyāna (divine meditation) and of ecstasy, the soul, forsaking its selfishness, may, even during bodily life, exalt itself momentarily to the Nirvāna; and for this reason this was also considered as one of the higher heavens, as the empyreum of the formless and colorless world. In progress of time the Nirvāna was divided into three kinds, the simple Nirvāna, the Parinirvāna or complete Nirvāna, and the Mahāparinirvāna or great complete Nirvāna, answering to the three degrees of wisdom and of sanctity. In the modern mystic-pantheistic schools, which contain a mixture of Sivaism, the Nirvāna means the absorption into the abstract, nameless monad or original Buddha. From a higher point of view, both the Sansāra and Nirvāna are each a naught; the former being changeable naught by deception; the latter naught absolutely. The Sansāra exists only to ignorance; it is a mere illusion of the Māya. From the destruction of this ignorance the Nirvāna results.—In the Kalpa of restoration the most perfect Buddhas appear to turn the wheel of faith, and inaugurate a new period of revelation and salvation. Innumerable Buddhas have already appeared. They are beings who have raised themselves with their own energy, by virtues and sacrifices of all sorts, in thousands of births, to this highest pinnacle. All are born in central India, and their mother dies on the seventh day after giving them birth; their doctrine is one and the same; in short, their whole biography is a stereotyped copy of that of Sākya-muni. They differ merely in parentage, one being of Brahmanic, another of Kshatriyic extraction; in age (which is determined by that of the period in which they reveal themselves), one living less than a hundred, another many thousands of years; in size, one being six feet, another 80,000 miles in stature, according to the character of the period. They are called Tathāgatas (*tathā*, thus; *gata*, known, and gone). The teaching of each evaporates with time, while sins grow. Then a Bodhisattva (intelligence of truth) is chosen among and by the blessed on high, who is to become, by a new birth on earth, a Buddha. His career has three stages of immeasurable length, viz.: 1, that of decision to become a Buddha; 2, that of prospect; and 3, that of nomination by the Tathāgata, whom he meets on earth. Only a monk possessed of the fruit of the four Dhyānas, and who has met with a Buddha during a preceding life, can thus be chosen. The exercise of the six Pāramitās (*pāra*: Lat. *præterita*—*itus*, a, um) of charity, kindness, patience, energy, meditation, and wisdom, in their highest degree, and during millions of existences, can alone fit the individual for this

career and mission.—Few of the innumerable Buddhas, who are said to have lived on earth many millions of Kalpas before Sākyamuni, are nominally recorded; but 24 of his immediate predecessors are mentioned by himself, all of whom promised him that he should become a Buddha; especially Dipankara Buddha and six others. Of the five saviours of the present Bhadrā Kalpa, three appeared before Sākyamuni, namely: Krakuchchanda (*krakach*, saw; *uda*, end), Karakamuni (*karaka*, gold; *muni*, saint), and Kāśyapa (*kāśya*, spirituous liquor; *pā*, to drink), while the fifth, Maitreya (*mitra*, friend, charity), is yet to come. Many legends concerning the predecessors of Sākyamuni are applied to him; and it is not absurd to suppose that he represented his doctrine as pre-Brahmanic. All these Buddhas of the dimmest antiquity are dogmatic, mythological, and fantastic personages. Our historical Buddha is also not altogether free from legendary qualities. For, says a legend, when in unfathomable fore-ages Brahmā saw a youth carrying his mother through a most terrible tempest, he instilled into his heart the wish to become a Buddha. This wish lasted during the revelation of 125,000 Buddhas, and his prospective stage was matured while 387,000 Buddhas were turning the wheel of faith. As a Bodhisattva he offered flowers to Dipankara, on a spot near the present Jelalabad.—The *Jātakas* (*jan*, to be born) and *Jātakamālas* (*māla*, wreath of flowers), or the migrations of Sākya, are a favorite subject of oriental monastic poetry, as well as of the pictorial and plastic arts, and a source of many pious frauds. *Dsanglun* (the wise and the fool), a Thibetan collection of such legends, and kindred works, are of recent date. Sākyamuni, although passing through 550 transformations (as king, hermit, priest, courtier, Brahman, Indra, merchant, and as animals of many kinds), in a Cingalese legend, preserved his Bodhisattvic character in the greatest purity. His sufferings on behalf of the salvation of the world were extraordinary in their number as well as in their horrible nature. These *Jātakas* took place mostly at Benares and on the Indus, about the time of Christ's birth, and the centuries immediately succeeding. A spot is shown even now at Attock, where, as a prince, he offered his body to be devoured by a starving tigress and her young; and a few miles thence another, where he used his own skin as a tablet, splinters of his bones as styles, and his blood as ink, to record a lost passage of the Dharma. In the legend of the royal prince Vesantara, his penultimate life as a Bodhisattva is ushered in by his *Mahājātaka*, or great birth. This legend is popular among all Buddhistic nations, from the Calmucks to Ceylon and Siam; in it he makes the most extraordinary sacrifices of his person and of his wife and children. Vesantara went to the heaven of the joyful; thence, in the shape of a white elephant, into the body of Mahā Māyā to be born as Sākyamuni. His

royal father became his other father, Sudhana. The law which he revealed is to last for 5,000 years, and disappear with the world before the advent of Maitreya, whom he has already crowned in heaven, and who will bring a period of peace and holiness to the earth. II. THE VINAYA (*vi*, before; *aya*, guide) is the discipline of the priests; on its parts, called *Sīla*, has reference to the morality of laymen. The *Sramanas* (sram, to tame) are bound to observe 250 ordinances. Of these ten are essential, viz.: not to kill, not to steal, to be chaste, not to lie, not to be drunk, not to eat in the afternoon, not to wear shoes, not to dance, &c., to abstain from ornaments, dresses, not to use a large bed, not to receive precious metals; five concern the respect to be paid to Buddha, to the law, and to the priesthood. Good conduct, good health, and a little learning suffice for admission to monastic life, even in very early youth. The novice is enjoined to eat only the leavings of laymen's meals, to wear a soiled garment of rags, to sleep near the roots of trees, to use the urine of animals as medicine, and not to boast of supernatural faculties. Ordination is performed with many ceremonies, on great festival days. The monk does not bind for the whole of life. The clerical dress, which consists of an under jacket, a reaching to the knees and fastened by a girdle, and a cloak over the left shoulder, all must be kept on even at night, and its lower tails that of the priestly character. Difficulties of climate, sects, and dignities have introduced some modifications; thus, Lamaists wear brown or violet garments. New and costly materials, cut in pieces, are sometimes sewed together and sprinkled with dust, to comply with the letter of the law. Except apostles and very holy men, all others shave their heads and wear beards at the new and full moon. The hands and teeth are kept clean. The indispensable implements of a Bhikshu or mendicant are a great, round, narrow-mouthed bowl, with a handle, for receiving alms; a sort of sieve or ewer to filter water; a staff or umbrella; a rosary of 108 beads; a razor, and needle. Besides these, he has no property, and must live altogether on alms, which he collects without importuning the givers.—Solitude and wandering about, begging without a fixed residence, were soon exchanged for residence in convents, with cells for single monks. Celibacy is strictly enjoined. The homes of luxury, of widows, and infidels, must be avoided by the begging monk. The receiving of alms or of presents is regarded as a favor to the giver, who is more benefited than the recipient. It is a sin to receive more than is needed for one meal, or to spill a part of the gift, or to separate liquid from solid victuals. All food is forbidden, and even vegetables are retained the power of germinating. Although poverty is a law for single monks, the monasteries can receive and possess great wealth, lands, serfs, &c., for the maintenance of

and stūpas. Obedience and subordination less required than fraternal and peaceful conduct. Sins are confessed twice a month, to an assembly of at least four priests. The penalties are not cruel, and consist in repentance, fasting, suspension, or expulsion, according to the character of the sins. Nuns (*Bhikṣuṇī*) are to observe the same rules as monks, and are respectful to them; some are allowed to live with their parents or friends. They shave their heads, dress in white, and go out begging, sometimes for the monastery. Abbots, or heads of monasteries, are chosen by a meeting of the monks; but in Siam and Burmah they are appointed by the king, and among the Lamas of Thibet they are elected by the college. The number of monks in a monastery is from four to many thousands, especially in northern countries; for instance, in the collegiate monastery of the Chutuks in Mongolia there are 30,000. On the whole, the hierarchy is more democratic than monarchical. We have seen that the uninterrupted line of 28 patriarchs, who are believed to have followed Buddha Śākyamuni, has no historical foundation. In Thibet, however, there is minutely regulated hierarchic and monarchical government under the dalai-lama, who is always reborn after death in another person, whose administration is carried on during his minority by regents.—In the beginning of Buddhism was very simple, without a complicated system of saints; but in progress of time they found teachers of theology: *Aryas* (venerables), who know the four truths; men of the three paths or fruits, those who have attained the stream which floats them into the Nirvāṇa, those who will return yet once to life, others who will not return; and *Archats*, or the worshipping, who are perfectly pure, infallible, endowed with miraculous powers, and see the Nirvāṇa. There are three still higher sorts of Archats, according to the three passages or vehicles: those having life on account of their being pupils of Śākyamuni; Pratyeka Buddhas, or self-saviours, a million times higher than Archats, comprehending all causalities; and Bodhisattvas, a sort of embryonic Buddhas. The three passages or vehicles are represented as being drawn, the little by antelopes, the middle by goats, the great by oxen. Buddha himself is represented to have been thrice reborn in body as ordinary men, of the most majestic beauty of appearance, with 32 great and 80 lesser characters of physical perfection, such as a protuberance on the head, with bluish-black locks flowing like a periwig, a tuft of hair between the brows, &c. His footsteps were marked with various emblems, such as a wheel with many spokes, an umbrella, an elephant's trunk, a lotus, Mount Meru, the sun, moon, tiger, and mystic crosses. The atmosphere about him is aromatic; his head is surrounded by a halo of light.—Buddhism favored the laity by admitting them to salvation, and reserving them to the priests. *Upāsakas* and

Upāsakis (*upa*, near; *ās*, to sit; suff. *aka*) are male and female religious servants, a sort of half monks and half nuns; bound to observe the first five of the above ten precepts, with the following five: not to swear or curse, not to talk nonsense, not to be concupiscent or greedy of pleasure, not to be malignant, to eschew superstition, heresy, and skepticism. In short, the whole morality is more one of endurance, patience, submission, and abstinence, than of action, energy, and enterprise. A general love of all beings is its nucleus; each animal being our neighbor or possible relative. To love even our enemies, to offer our lives for animals, to abstain even from defensive warfare, to gain the greatest of victories by conquering one's self, to avoid all vices, to practise all virtues of humility and mildness, to be obedient to superiors, to cherish and respect parents, old age, learning, virtuous and holy men, to provide food, shelter, and comfort for men and animals, to plant trees on the roads, dig wells, &c.—such are the moral duties of Buddhists. No religion is despised by them; religious wars waged against dissenters have never been heard of among them; the only contest on record being that between the Thibetan Yellow and Red caps, in which the latter were driven out into the high valleys of the Himalaya (Bootan, Nepal, Ladakh, &c.). "Honor your own faith, and do not slander that of others," is a Buddhist maxim. Kublai Khan, who became a convert in 1259, allowed priests of all creeds to "swarm at his court," who were eager to convert him to their own faith. The persecutions of Christians in Japan, China, Siam, &c., are occasioned by other than religious causes, being commonly reprisals against their intermeddling habits. National barriers have been most effectually levelled to the ground by Buddhism. Polygamy is not countenanced, but merely tolerated where it had existed before Buddhism came in. Monogamy is the rule in Ceylon, Siam, and Burmah; somewhat less so in Thibet, Mongolia, and among the Calmucks. Illegitimate children are not disowned or abandoned, but taken care of, although they have no equal right of inheritance with the strictly legitimate. Woman, in general, is better treated than by any other oriental religion. In the cold, high regions of Thibet, and in the Himalayan valleys, polyandry is not rare, several (sometimes as many as ten) men, mostly brothers, having but one wife.—Worship, in our sense of the word, arose slowly and late in Buddhism. Almsgiving, confession, preaching, explaining the reasons for the inequality of fortune, and other relations between the clergy and laity, produced at last the use of prayers, of adoration, and of sacrifices. The memory of Śākyamuni, his pretended image, his relics, and afterward those of others, became objects of idolatry. Buddha is said to have made a portrait of himself, which became the stereotyped model of an infinity of images, statues, and the like. The

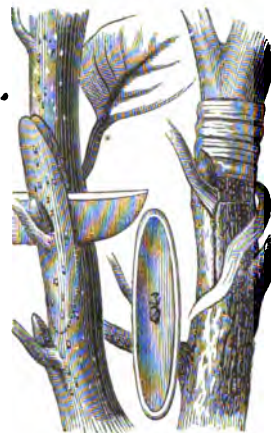
ancient Buddhist paintings in fresco, as found in grottoes, are highly creditable to the taste and skill of the painters, who were mostly monks. Three sorts of relics of Buddha and of saints are distinguished, viz.: bodily *dhātus* (elements) or *sarīras* (*sarī*, to injure), such as teeth, hairs, nails, pieces of bones; things once possessed by the saint; and objects with which he came into contact. The most renowned relic is Buddha's left eye-tooth, the present palladium of Ceylon, whose history is quite romantic and miraculous. It is a piece of bent ivory, about two inches long, kept in a splendid chapel and surrounded by many jewels. Buddha's skull, eyeballs, shoulder blade, &c., his manuscript of the Dharma, his gowns, alms-pot, &c., his shadow, heaven-ladder, his animal bodies, as bird, elephant, &c., the Bodhi tree at Gāya, and many other relics, are shown in various places. Relics are kept in *stūpas* or *topes* of peculiar construction; the shape of a water bubble, and one or several umbrellas, being characteristic and symbolic features of these monuments, among which the celebrated porcelain pagoda of the convent of celestial beatitude at Nanking is the principal. Most have cupolas; but some, like the *sourghans* of the Mongols, are pyramids, or only truncated pyramids. Their height is from a few inches to three hundred feet and more. Most of them contain a small cavity, in which the relics are kept; but some are solid. A trinity, called *Triratna* (three jewels), was at last developed in the less than unitarian Buddhism, probably the prototype of the Brahmanic *Trimurti*, but certainly a personification of the ancient formula, "Buddha, *Dharma* (law), and *Sangha* (collection)." We know the two former. *Sangha* is the collection or congregation of saints, or what we call the church or the council; but at last it came to mean simply the priesthood. Since the priesthood was the representative of Buddha and the expounder of the Dharma, it became itself the whole trinity, and even God; though in pure Buddhism no God is mentioned. The original formula of a prayer, "I take refuge with Buddha, I take refuge with Dharma, I take refuge with Sangha," is repeated mechanically *ad infinitum* by the aid of the beads; the movement of the lips being sufficient to render it efficacious. At last praying machines were constructed, consisting of a sort of hollow barrel, which turns on an axis, and in which the prayer, written on a great many little scrolls, is turned about. Fa-hian, the Chinese pilgrim, describes (A. D. 400) some which he saw. Some are colossal, and moved by wind or water, or by special turners, or merely kicked into motion by passers by; others are small, and carried in the hand. Magic formulas of exorcism, storm-making, raising from death, &c., remnants of ancient Shamanism, have been engrafted upon Buddhism among the Mongols and Calmucks. Sermons have also become an integral part of worship,

as also processions around temples or *stūpas* with relics; sacrifices of fruit, flowers, incense eatables (not bloody); confession of laymen; consecration of sacred water, sacred baths and baptisms (in Mongolia), fasting, psalm-singing, chorals, benedictions, litanies. The lamas are dressed in pontificals, like those of the Catholic bishops. The temples are square, with nave and lateral halls, separated from the columns. Opposite the entrance is the sanctuary with the altar, and images of saints. In some there is a dagoba under a cupola. Paintings, banners, garlands, tapestries, and allegorical representations adorn the church. There are eight altar implements: an umbrella, a horn, crosses entwined in a knot of 24 angles, a lotus flower, a gold fish, a ewer, a wheel, an allegory of five senses, all symbolic of Buddha, and made of pasteboard or of metal, varnished, gilt, and painted. On the altar are sacrificial shells, sacred vessels, metallic mirror to reflect Buddha's image, round plate with five protuberances, representing the Meru and the four *Dvīpas* or quarters of the world, and a chalice. Fumigations, illuminations, music, bell-ringing, and many other things similar to those used in the west, attend the rites. Besides the festivals at the new and full moon, and some others in different countries, there are three great annual festivals. One is called the lamp festival, at the close of the *Varsha*, or rainy season, our autumn; there is another at the beginning of spring; one on the day of the conception or birth of Śakyamuni, whose time varies in different countries. There is also, in some parts, a fourth festival when the images of Buddha and of the saints are carried about on wagons; and in the north a fifth is that of the consecration of water, rivers, lakes. The lamas also say masses for the repose of souls. Synods are held annually or quinquennially; the latter, in olden times, on the sacred plain at the confluence of the Ganges and Jumna, called the great alms field. Family worship takes place at different stages of life, such as birth, naming of the child, haircutting at puberty, marriage (though this is merely a civic and not a religious act), death, funerals; at all of which the priest is present, although not necessarily, as in Europe. The priest acts also as a physician, and in the north as a sorcerer, magician, or *angur*.—*Samādhi* (*sam*, together; *dha*, to have hold), or meditation, for the sake of arriving at the extinction of the selfhood in the manner described above is the acme of spiritual life. It consists of four degrees: 1, consideration of one thing as distinct from others, with satisfaction at the discernment of multifarious things; this frees one from the conditions of sin; 2, suppression of that discerning judgment, reduction of the many things to one, with pleasure thereat; 3, indifference in the discernment by judgment, memory and consciousness yet active, with a dim feeling of bodily well-being; 4, complete indifference, purification from all feeling of joy

tain. Nothing can resist contemplation, and Bodhisattvas thereby reach the 28th heaven. There are theories concerning 108 Samādhis. After the 28th heaven there is yet *Nirodha* (ni, more; *rodh*, to oppose), or the obstacle, before the Nirvāna can be attained. Whether the obstacle necessarily ends life is not yet ascertained. The fruit of Samādhi is *jñāna*, science or omniscient omnipotence, containing *Moksha* or final liberation. III. THE ABHIDHARMA (*abhi*, over, upon, and *dharma*) constitutes Buddhistic metaphysics, and is deduced indirectly from Sākyamuni. The southern Buddhists say, "Sūtras are for men, Vinaya priests, Abhidharma for gods." There are two sources of knowledge: sensual perception and logical deduction. There are two principal philosophic schools: 1, that of the *Vijñānavādins*, or dilemmists, who maintain the necessity of immediate contact with the object to be known; 2, that of the *Sautrāntikas*, who insist on perception and on deduction therefrom. Some among the former reject the existence of the world. Buddhistic logic is exceedingly contradictory. Each determination is in naught. To be is said also not to be. A common formula of arguing is this: "A thing is and is not, and it neither is nor is not." The method is purely dogmatic and dialectic, proceeding with stereotyped categories and formulas. Philosophy, cosmology, and theology are an ever-turning wheel without any location. In general, the wheel and water bubble are the constant emblems and symbols of Buddhistic reasoning, which is most developed in the theory of the "great passage." Matter is merely a product of morality. Some schools count five elements, with as many qualities and senses; some have six, viz.: earth, hard, nose; water, wet, tongue; fire, hot, eye; air, movable; ether, audible, ear. To these is added *Manas*, or common sensorium, whose objects are the *Dharma* (law, being, nature, matter) and the *Vijñāna* (science, conscience). Some systems admit a specific soul or self (*Jīva*, *ātman*, *Upādhi*); others deny it. It is needless to enter into further details, and we conclude with a list of the following chain of 12 links (*Nidānas*: *nā*, in, on; *dā*, to give): 1, birth and death; caused by (2) birth; caused by (3) existence; this by (4) attachment to senses; this by (5) desire; arising from (6) sensation; which presupposes (7) contact; this by (8) senses; which perceive (9) forms and names; this by (10) distinction; caused by (11) conception of objects or consciousness; which comes from (12) feeling and action; this being, at last, the result of (12) *Avidyā* (non and *videre*), or ignorance. All these illusions must be annihilated before we can sink into the emptiness of the Nirvāna.—See "Journal of the Royal Asiatic Society" and "Asiatic Researches," especially articles by Hodgson in vol. ii. of the former and vol. xvi. of the latter; Burnouf, *Introduction à l'histoire du Bouddhisme indien* (Paris, 1844), and *Lotus de la bonne loi* (1865); Hardy,

"Manual of Buddhism" (London, 1850), and "Eastern Monachism" (1853); Köppen, *Die Religion des Buddha* (Berlin, 1857); Barthélemy Saint-Hilaire, *Le Bouddha et sa religion* (Paris, 1860); Schlagintweit, *Buddhism in Tibet* (Leipzig, 1863); Eitel, "Handbook of Chinese Buddhism" (London, 1870); Alabaster, "The Wheel of the Law, from Siamese Sources" (London, 1871).

BUDDING, a method of propagating trees and shrubs. The seeds of cultivated fruits, when planted, seldom produce trees bearing fruit true to their kind. Young trees, grown from seeds, are called stocks. They are removed from nursery beds when in a thrifty state, set in regular nursery rows in good ground during early spring, and in summer worked with choice buds from fruit trees. Large trees are frequently remodelled by the inoculation of young shoots with buds from more desirable varieties of fruit than their natural product. When a bud is carefully removed from a tree, it bears all the characteristics of that tree, and when properly set in a thrifty young stock will unite with it, and produce a tree similar to the one



Budding.

from which it was removed. The results produced by budding are the same as those brought about by grafting; but the former has many advantages, as follows: 1. Stocks may be budded at an earlier age than they can be successfully grafted. 2. Stocks may be budded the same season they are transplanted, although they ought not to be grafted until the ensuing season. 3. Budding is a more rapid operation than grafting, a workman being able to set two in a minute. The work is also done at a season when there is not so much hurry as in the spring, when grafting is performed. 4. If a tree be budded during summer, and the bud dies, the operation may be repeated the same season, or the stock grafted the ensuing spring; whereas, if it be grafted first, it may be entirely lost. 5. Very choice trees may be rapidly propagated by budding, one bud being sufficient to reproduce the variety, while in grafting several buds are used at once.—For budding, a sharp, thin-bladed, round-pointed knife is used, with a handle terminating in a thin wedge-like piece of ivory or bone, which is useful in raising the bark of the stock. The buds are taken from shoots of the present year's growth, when they have become per-

fectured; this may be known by the formation of the terminal bud. Should the shoots be backward in growth, they may be more rapidly perfected by pinching off the upper end, checking their growth, and ripening the parts. The buds to be removed are developed in the axils of the leaves, or that point where the leaf joins the stem. The buds should be well formed before being removed, or they will be of no value. When of proper age, the young shoot from which the buds are to be taken is cut away with a sharp knife, and the leaves are removed from it, while their footstalks are left attached to the buds as handles. The removed shoot is then called a "stick of buds." They may be wrapped in damp cloths and laid in a cool place for several days, if necessary; or they may be packed in moist sawdust to exclude the air, and thus sent a long distance with perfect safety. The operator selects a smooth place on the stock, making an incision across it through the bark, and another at right angles to and below it, so as to form a T; the bark is raised on each side of the cut by the ivory handle of the knife, and the stock is ready. Taking the stick of buds in his left hand, the operator inserts his knife above the bud, bringing it out below, so as to cut away the bud, a portion of bark, and a part of the wood. Mr. P. Barry, in his "Fruit Garden," says: "When it happens that the knife passes exactly between the bark and wood, the bud cannot fail to be good; but this rarely happens; more or less wood is attached, and the removal of this is the nice point. Where the buds are flat, the difficulty is less than where they have large, prominent shoulders, as the plum and pear have in many cases. When all the wood is taken out of these, a cavity remains which does not come in contact with the wood on which the bud is placed, and therefore, although the bark unites well, the bud will not grow. Sometimes such as these are separated by making an incision through the bark, lifting the edge of the bark attached to the bud with the knife, and pushing it off with the fingers. A safer way still is to cut around the bud and draw a strong silk thread between the bark and the wood, thus removing the bud in perfection." Mr. J. J. Thomas, in his "Fruit Culturist," says: "The English practice of taking out the small portion of wood cut from the shoot has been found, in the climate of this country, not only useless, but really detrimental. Indeed, it often happens that buds of the cherry and other trees of rather spongy growth and slow adhesion succeed much better when a thick portion of wood is taken off than otherwise, the wood in such cases assisting in the retention of moisture until cemented to the stock." Having prepared the bud, insert it quickly in the incision on the stock, and, commencing at the bottom, wrap the bud and stock with strips of bass matting, merely leaving the vital point of the bud exposed, and making the whole impervious to air and water.

The bud will soon swell, when the tie should be loosened, and finally removed. This will happen in from 10 to 20 days. Should a length of time elapse from the removal of the bud to its insertion, it should be held in the mouth to keep it moist.—The time for budding is usually from July 15 to Sept. 15. The rule that can be given is, to secure the perfect development of the bud, and to ascertain that the bark of the stock separates freely from the wood. This will occur earlier or later, according to the kind of tree, location, and season. The inserted bud will remain in the stock in a dormant condition until the ensuing spring, when the top of the stock is removed a few inches above the bud; thus the latter receives the whole sap of the stock, and when a shoot is produced it is stayed by being tied loosely to the stock left above the insertion. Later in the growth of the tree the stock is cut down to the butt of the new shoot, which rapidly heals the wound, and the young tree becomes a true representative of the variety from which the bud was originally derived. Budding is sometimes performed in spring, sometimes in June, but these are not desirable periods.—Anchor budding, instead of making a cross incision so as to form a T, cuts are made from the upper end of the vertical incision at a slight angle, so that the whole is shaped like an anchor \wedge . The bark may be more readily raised from the stock than in the old method.

BUDE (*Budæus*), Guillaume, a French scholar, born in Paris in 1467, died Aug. 23, 1540. He studied philosophy, mathematics, and the Greek language, the latter under Lascaris. In 1519 he published the *Commentarii Lingue Græcæ*, which gave an impulse to the study of Greek literature in France. He was also engaged in public affairs under Louis XII. and Francis I. He persuaded Francis not to issue an edict prohibiting the printing of books, which had been urged by the Sorbonne. He was royal librarian of France and the royal library at Fontainebleau were founded through his efforts. At the time of his death he was royal librarian. He was suspected of Calvinism, and after his death his family openly espoused the reformation. After the massacre of St. Bartholomew they were obliged to flee from France. A part of them went to Switzerland, retaining their original name of Budé; another the possessions which they there acquired was the estate of Ferney, afterward occupied by Voltaire, though still owned by the Budé family. Another branch emigrated to Pomerania, where they assumed the name of Budde, Latinized into Buddeus. (See **BUPPERS**.)

BUDE LIGHT, the name given to the method of increasing the light of coal gas, or of argand burners of lamps, by introducing oxygen gas into the interior of the hollow flame. The process was contrived by Mr. Goldsworthy Gurney, of Cornwall, England, and called Budé light from the name of his residence. The materials consumed to produce light burn

in the ordinary hollow flame; only the portion of this is exposed to the oxygen of the atmosphere, and the gases in the interior are carried off only partially consumed. By passing a current of oxygen gas upward through the internal cavity of the flame, all cases meet the full supply of this element, thorough combinations take place, with fully increased vividness of light. It is a process, however, that can only be advantageously conducted upon a large scale. According to the quantity of oxygen supplied, the color of the light varies from perfect white to red.

BUDGELL, Estace, an English writer, born at Thomas, near Exeter, in 1685, died in 1736. He assisted Steele in the composition of the "Sentimental Journey," and Addison in the "Spectator," where his contributions are distinguished by the signature X. In 1717 Addison obtained from him the place of comptroller general of the revenue in Ireland. He lampooned the Irish lord, and was removed from office; and in 1720 he lost £20,000 by the failure of the South Sea scheme, and afterward spent £5,000 more in unsuccessful attempts to get into parliament. He then employed himself in writing against the ministers. In 1738 he began a weekly periodical called the "Bee," which continued for more than 100 numbers, and has been reprinted in 12 vols. 8vo. Soon after this a legacy of £2,000 was left him in the will of his friend Dr. Tindal, but Budgell was accused of having interpolated this passage into the will, and the legacy was annulled. He then studied law, and was called to the bar, but meeting with no success he committed suicide by leaping from a bridge into the Thames. He left in his room a paper on which was written, "What Cato did, Addison approved, cannot be wrong."

BUDWEIS (Czech, *Budejovice*), a fortified town of Bohemia, on the Moldau, 77 m. S. of Prague; pop. in 1870, 17,413. It is the seat of a Roman Catholic bishop, and contains a cathedral, a council house, two gymnasia, and flourishing manufactures of woollen, damasks, muslins, &c. The railway, completed in 1832, which connects Budweis with Linz, was the first one built in Germany. Near by is the Schloss Frauenberg, one of the seats of Prince Schwarzenberg, attached to which is a park containing 800 wild swine.

BUELL, Jesse, an American agriculturist, born at Coventry, Conn., Jan. 4, 1778, died at Albany, Oct. 6, 1839. He learned the trade of a printer, and in 1818 went to Albany, N. Y., and established the "Argus," a political newspaper, which he conducted till 1821, when he retired to a farm near Albany. The land on which he chose had been almost worthless until the system of cultivation hitherto pursued; by fertilizers and more perfect tillage he made it one of the best farms of the state. He was frequently a member of the state legislature, for a while judge of the county court, and at the time of his death one of the regents of the university. In 1834 he commenced the

publication of the "Albany Cultivator," which he edited for six years. He also conducted the "Farmers' Instructor" (10 vols.), and the "Farmers' Companion" (1839). In addition to these publications, he delivered an immense number of addresses upon his favorite subject in almost all parts of the United States.

BUELL, Don Carlos, an American general, born near Marietta, Ohio, March 23, 1818. He graduated at West Point in 1841, and served in the Florida war and on frontier duty till 1845. In the Mexican war he was present at the battles of Palo Alto, Resaca de la Palma, Monterrey, Cerro Gordo, Contreras, and Churubusco, where he was severely wounded, receiving the brevets of captain and major. In the latter part of 1847 and in 1848 he was employed in the adjutant general's office at Washington; from 1849 to 1861 as assistant adjutant general in the departments of New Mexico, Texas, the East, the West, and the Pacific. After the commencement of the civil war in 1861 he assisted in organizing the army collected near Washington. In November of that year he was placed in command of the department of the Ohio, his headquarters being at Louisville, Ky. On March 21, 1862, he was made major general of volunteers, his department being incorporated with that of the Mississippi, under Gen. Halleck. He appeared with a part of one of his divisions on the battle field of Shiloh, April 6, in time to succor the hard-pressed force under Gen. Grant; on the following day, his other divisions having come up, the confederates were worsted, and fell back to their intrenchments at Corinth. In June he was placed in command of the newly formed district of the Ohio, with his headquarters at Huntsville, Ala. In July and August the confederates, under Bragg, marched into Kentucky, compelling the abandonment of Lexington and Frankfort, and threatening Louisville and even Cincinnati. On Sept. 30 Buell, by order from Washington, turned over his command to Gen. Thomas, upon whose request it was at once restored to Buell. A part of Buell's army came up with a part of the confederate force at Perryville, Oct. 8, where an indecisive action was fought. The confederates retreated leisurely to Cumberland gap, and Buell did not follow them. On the 24th he was directed to transfer his command to Gen. Rosecrans, and a court of inquiry was ordered to investigate his operations in Tennessee and Kentucky. The action of this court has never been published. Gen. Buell was mustered out of the volunteer service May 23, 1864, resigned his commission in the army June 1, and in 1865 became president of the Green River iron works, in Kentucky.

BUEN AYRE, or *Bonaire*, a small island in the Dutch West Indies, 25 m. E. of Curaçoa, used as a penal depot; pop. about 4,000. It is a highland, sloping to the S. W., on which side there is a very good roadstead. The principal trade of the island is in salt, but cochineal is also produced.

BUENA VISTA, a N. W. county of Iowa; area, 576 sq. m.; pop. in 1870, 1,585. Storm lake is situated in the S. part, which is also watered by Coon river and affluents of Maple river; the Little Sioux skirts the N. border. The Dubuque and Sioux City railroad traverses the county. The chief productions in 1870 were 7,780 bushels of wheat, 9,085 of Indian corn, 6,450 of oats, 4,617 of potatoes, 151 tons of hay, and 26,475 lbs. of butter. There were 299 horses, 874 milch cows, 717 other cattle, 249 sheep, and 172 swine. Capital, Prairieville.

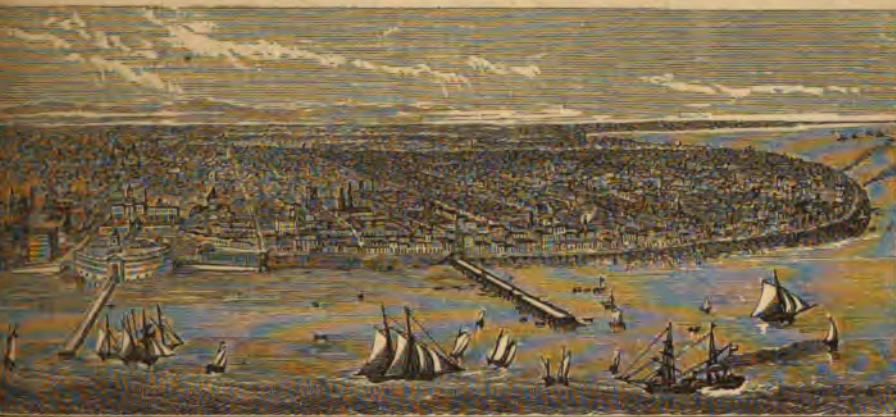
BUENA VISTA, a hamlet of N. E. Mexico, at the S. extremity of the state of Coahuila, 7 m. S. of Saltillo, near which a battle was fought, Feb. 22 and 23, 1847, between the Americans under Gen. Taylor and the Mexicans under Gen. Santa Anna. The Americans numbered about 5,000; the Mexicans were about 20,000, but the ground was such as to render their cavalry and artillery nearly useless, and partially to neutralize their superiority in infantry. Taylor having refused to surrender at the summons of Santa Anna, the attack was commenced by the latter in the afternoon of the 22d, and by night he had gained the summit of a ridge, and the Americans were withdrawn to the plain at its base. The battle was renewed at daybreak on the 23d, and after some skirmishing the Mexicans moved in three heavy columns upon the Americans, whose left was turned and put to flight; but the centre and right stood firm, and checked the advance of the enemy by a rifle and artillery fire, and finally drove them back. Two cavalry attacks were repelled, and the Mexican infantry on the right driven from the field. Santa Anna then formed his whole force into a single column, which drove the Americans back for some distance, but was checked by the artillery, and at night the two forces occupied nearly the same ground as in the morning. During the night the Mexicans retreated. The American loss was 746, that of the Mexicans about 2,000.

Buenos Ayres. I. One of the four littoral provinces of the Argentine Republic, extending from lat. 38° 31' to 41° S., bounded N. by the provinces of Córdoba, Santa Fé, and Entre-Ríos, being separated from the last by the Rio Paraná; E. by the Rio de la Plata and the Atlantic; S. by the Rio Negro, which forms the boundary line with Patagonia; and W. by the pampas and the province of San Luis. The W. limit has not yet been definitely marked, but it is somewhere between lon. 64° and 65° W. Area, 70,000 sq. m.; pop. in 1869, 348,866, of whom 151,241 were of foreign birth, chiefly Italian, Spanish, French, and Irish. The coast line measures about 540 m., and is for the most part low and sandy. The only noteworthy ports on the seaboard are Bahía Blanca and Patagones, or El Cármen, and these are little frequented owing to the perilous navigation of the sea in their vicinity. The chief port is Buenos Ayres, on the Plata, 180 m. from the sea. With the exception of the Guaminí, Ventana

Tandil, and Volcan mountains, which originate near the coast S. E. of the capital, and locate themselves in the pampas, the province is a vast plain, somewhat roughened with hills to the N. and N. E., and clothed with an alternate growth of clover and gigantic thistles to the W. of the city of Buenos Ayres for a distance of some 200 m., and still further westward with long grass besprinkled with flowers and unencumbered by weeds. The S. portion is about equally divided between stony, sterile wastes, and immense marshy tracts intersected with salt lagoons, which evaporate in the dry season, leaving the soil covered with pure salt. Agriculture has hitherto been much neglected and even despised by the inhabitants, notwithstanding the fertility of the soil, which is chiefly composed of a rich vegetable mould, varying from 9 to 33 inches in depth. Wheat of a fine quality is raised, but prior to 1872 the quantity was inadequate for the local consumption. In December of that year a vessel was freighted for the export of wheat, the first ever sent out of the republic. The staple production is potatoes, two crops of which are raised each year. Since the introduction of railways many new farms have been established and large quantities of wheat are sown. There are 150 flour mills, and a few vermicelli factories; but little other manufacturing is carried on. There are some thriving colonies in the north, chiefly Swiss. The principal branch of industry is cattle-raising, in which the country is admirably suited. The hundred varieties of grass, elsewhere produced only by great labor, here grow spontaneously affording pasturage for 30,000 sheep to a square mile, these natural meadows being mostly let out in large *estancias*, or cattle farms. The most extensive sheep farmers in the province are the Irish settlers, who have largely contributed to the development of that industry, which enables Buenos Ayres to rival Australia in the production of wool. In 1866 there were in the province 6,000,000 horned cattle, 1,800,000 horses and asses, 60,000,000 sheep, 115,000 swine, and 5,000 goats. The wool clip for that year was estimated at 100,000,000 lbs., and the shipment of wool has since rapidly increased. The chief exports are hides, tallow, sheepskin, wool, and jerked beef. The climate is generally salubrious, but subject to sudden changes according to the direction of the wind. The rocks in the province are granitic, which in the Ventana, however, is covered by green clay slate and pure white quartz. Numerous fossil remains of colossal mammalia are imbedded in the diluvial deposits of the pampas. Red and yellow shale, gneiss, limestone, and gray quartz occur in the Tandil; agates are found chiefly of the jasper variety. The portion of the province is watered by innumerable small streams falling into the Plata and the Paraná, chief among which are the Luján and the Arrecifes; the rivers of the centre and south are the Salado, carrying the waters

ke Carpincho to the ocean at San Borombon, and the Colorado and Negro, both navigable for a considerable distance from the Atlantic; and the country is interspersed with numerous lagoons and salt marshes, which are dry one half of the year.—The province consists, besides Buenos Ayres, 78 towns, districts (*partidos*), and colonies. There are 440 public and private schools, attended by 28,373 pupils of both sexes, or less than one third of the total number (99,213) between the ages of 6 and 14. These figures indicate, however, a considerable improvement in educational statistics as compared with those of former years. There is at Santa Catalina, about three leagues from Buenos Ayres, a model farm with a free school of agriculture; the government will expend \$100,000 in the development of this enterprise. Four lines of railway lead from the capital to the interior: the northern, about 30 m.; the

western, 100 m.; the southern, 72 m.; and the Ensenada, 10 m. A submarine telegraph cable has been laid from the capital to Montevideo; and a line across the Andes was completed in July, 1872, connecting Valparaiso and Buenos Ayres. The total length of telegraph wires in operation in December, 1872, was about 4,000 m.; and some 1,500 m. were in process of construction. The provincial government is divided into four departments: the legislative, composed of a senate and a chamber of deputies; the executive, composed of the governor, elected by the people for three years, and two ministers; the judicial, consisting of a superior court or court of appeals, and departmental judges of first instance for civil, criminal, and commercial cases; and the municipal department, whose power does not reach beyond matters of a purely local character. A special convention was in 1872 engaged in re-



Buenos Ayres.

vising the provincial constitution, with a view to the adoption of important modifications. Like all the other provinces, Buenos Ayres has revenue of its own, independent of the national revenue; but its liabilities are not all external as are those of the other provinces. Its budget requires \$2,000,000 annually to defray the expenses of the government, militia, schools, &c.; and it contracted a foreign loan of £1,034,700 in England in June, 1870, at 6 per cent. interest, redeemable at par in 33 years. The provincial income in 1869 was said to be only \$600,000. II. A city, the capital of the province and of the Argentine Republic, situated on the right bank of the estuary of the Rio de la Plata, 180 m. from the sea, and 123 m. W. of Montevideo; lat. 34° 36' S., lon. 58° 36' W.; pop. in 1869, 177,787, of whom 41,957 were Italians, 13,998 Spaniards, and 13,402 French. Of the remainder, about 5,000 were native Argentines of European descent, 10,000 native Montevideans, 10,000 English, Irish, Americans, and Germans, and the rest Indians. This city, which is, after

Rio de Janeiro, in nearly all respects the most important in South America, differs in its leading characteristics little from the large cities of the North American and European seaboards, and has been called the Athens of South America. It is in shape a parallelogram, having the long sides from E. to W., and the N. side on the estuary, which is here nearly 30 m. wide. All the streets are parallel to the respective sides. It covers an area of nearly 2,000 acres, and is divided into blocks 450 ft. square, presenting, when viewed from an eminence, the appearance of an immense chess board. The early Spanish settlers who planned the town, which they called Santissima Trinidad de Buenos Ayres, made the streets only 36 ft. wide, and the houses, which were built of sun-dried brick, had rarely more than one story. Modern buildings have, however, gradually taken their places, and since 1860 the city has rapidly improved in appearance, and has been embellished with handsome edifices of three or four stories. A corresponding improvement has been made in the

internal arrangement of the houses of the wealthy citizens and of English residents. Of the streets, 88 in number, 31 run due W. from the river, and the remaining 52 N. and S.; the pavement and sidewalks are very irregular and dilapidated, but the streets are well lighted with gas. Drainage is still unknown. Though situated upon one of the largest rivers of the globe, the city is poorly supplied with water, that of the wells being brackish, and that brought in carts from the river sold at a high price. The sanitary arrangements are bad. Offal, garbage, and waste water are thrown into the streets, or suffered to accumulate in cess-pools under the dwellings. In 1872 a plan was proposed and accepted for introducing a thorough system of drainage and an adequate supply of pure water; and the works were to commence about the month of December. But in spite of the defects just alluded to, and of sudden changes of weather, the health of the city is generally good, the temperature rarely falling below 18° or rising above 90° in the shade. There are 10 plazas, or squares, the largest of which, the plaza Victoria, covers an area of nearly five acres, the centre being ornamented with the column of Liberty, bearing the inscription "25 de Mayo, 1810," in commemoration of the revolution of Buenos Ayres. The four sides of the square are bordered with paradise trees and provided with marble seats. On one side is the old *cabildo*, or town hall, erected at the beginning of the last century, and now occupied by the several law courts. On the N. side are the archiepiscopal palace and the cathedral; the latter, though somewhat massive, is not inelegant. The Recoba Vieja, in another part of the square, is a sort of Moorish arcade with an ungainly triumphal arch of brick in the centre. The Recoba Nueva, another arcade, is opposite to the cathedral, and is, like the Recoba Vieja, occupied by small shops. Near the plaza Victoria is the plaza Veinte y Cinco de Mayo, in which is the custom house, overlooking the river. Part of that building is used as a national government house, and in the upper story are the president's saloons, where foreign ministers are received. The congress hall in the same vicinity is a small amphitheatre capable of containing 800 persons; the session lasts from May to November. Near the custom house is the station of the Northern railway or tramway; a large central station is projected to be built at this point, in which the four city railways shall meet. Political and other offenders were in former times shot in this square. The plaza Marte, or del Retiro, at the N. E. corner of the city, contains a bronze equestrian statue of Gen. San Martin, barracks for 1,000 men, a steam saw mill, the first introduced in the country, and a railway station. In the plaza Lorea is a market established in 1864. The plaza del Parque derives its name from the arsenal; it is a sort of public garden with a casino in the centre. There are five spacious

markets. Part of the municipal revenue is derived from fees for market stalls; and butchers' or vegetable shops are allowed within half a mile of the several markets. There are seven hotels and many private lodging and boarding houses; nine German, one foreign, and three national clubs; and a British circulating library with 2,000 volumes, established about 1880. The Colon opera house, the first in South America, was built in 1856 at a cost of \$200,000; and there are likewise the Victoria theatre, devoted to the Spanish drama; the Franco-Argentine theatre, for opera bouffe; and the Coliseo, an Anglo-German concert hall, with seats for 500 persons. The provincial government house occupies half a block, and contains around a spacious courtyard the various public offices. Opposite the government house is the state library, with 18,000 volumes, and some manuscripts valuable for their antiquity. There are various other libraries, chief among which is the national library, founded in 1870 under the auspices of President Sarmiento. The chamber of the provincial legislature occupies a hall like an amphitheatre, with galleries for the public, where 400 persons may be seated. The emigrants' home, in the calle Corrientes, provides gratuitous board and lodging for distressed immigrants until they find employment; it is supported by the national government and by subscription, the annual expenditure being about \$5,000. There is a public lottery, 15 per cent. of the total receipts of which are applied to the various municipal charitable institutions. The museum of Buenos Ayres, founded by Rivadavia in 1823 is said to possess the richest collection of antediluvian fossil remains in the world, among which are 50 specimens found in Buenos Ayres of animals no longer known. The university of Buenos Ayres was founded in 1821 by Governor Rodriguez and his minister Rivadavia; the studies embrace the usual classic and scientific courses, and modern languages; and degrees are conferred in theology, law, and medicine. To the national college, in which the studies are analogous to those of the university, each province has the privilege of sending a certain number of boys, who are educated, boarded, and lodged gratuitously. There are 43 schools supported by the municipal government; 15 dependent upon the department of schools (established in 1852); 17 for females, sustained by the *sociedad de beneficencia*, composed of charitable ladies; and 98 private schools. There are also a theological seminary, a Jesuit college, a college directed by French priests, and several denominational schools connected with the various English, Scotch, American, and German churches: an infant school, and a number of night schools, opened in 1871. Besides the cathedral, there are 15 churches, 6 chapels of ease, and 4 Protestant churches. There are two monasteries and two convents of cloistered nuns, which escaped the suppression of religious orders after

independence. The French Sisters of Charity have numerous institutes and schools, and the Irish Sisters of Mercy have a school and a hospital. The predominant religion is the Roman Catholic; but all others are tolerated, and the ministers of some denominations are paid by the national government. There are two lunatic asylums, the Recoleta, and the English for Protestants; two general hospitals, one for males, the other for females; and also French, English, Italian, and Irish hospitals. The sanitary institute is the first institution of its kind on the continent. By the payment of a yearly subscription of \$12, any person can secure the right to enter the institution when sick, and remain there until cured. There are a lunatic asylum, an asylum for the poor, a foundling hospital established in 1779 by José Riglos, the viceroy Vertiz, a female orphan school, a deaf and dumb institute. The police force is imperfectly organized, and is composed of only 200 *vigilantes*. Several lines of horse roads traverse the city and suburbs. Besides railways leading to interior points, there is most daily communication by steamers with various river ports, and stage coaches ply between the camp towns in the interior. Steamers sail monthly to the Atlantic ports of Bahia Blanca and El Carmen.—The shoals and quicksands in the Plata render the approach to the city extremely difficult for ships of deep draft. Vessels of 16 or 17 ft. must anchor from 6 to 9 m. from shore. Two piers of 1,300 and 1,000 ft. were built in 1855, one for passengers, and the other opposite the custom house for merchandise. Before that time passengers and freight were carried ashore by carts on wheels of immense diameter, which went two or three cables' length to meet the boats. Even now carts cannot be entirely dispensed with, for at low water neither light nor small boats can approach the piers. The returns of the statistical department give a total of 2,297 sailing vessels and 1,628 steamers, with an aggregate tonnage of 1,526,284, the whole republic, four fifths belonging to the port of Buenos Ayres. During the year ending Sept. 30, 1870, the exports of ox hides tanned and dried, horse hides, tallow, wool, skins, and jerked beef, amounted to \$1,294,690, against \$27,320,000 in 1869. Imports, chiefly cotton, woollen, and linen fabrics, furniture, hardware, machinery of all kinds, wheat, coal, iron, wine, beer, boots and shoes, &c., were estimated at \$40,000,000 for the year 1870. Although one of the staple exports is the raw material for boots and shoes, immense quantities of these articles are exported. The total exports to the United States in the same period reached \$6,473,927, while the total imports from the United States were only \$2,087,999. The export duties on animal products amount annually to 3,000,000 dollars. The *casa de moneda* (mint), or bank of the province, is the headquarters of the paper money; the Mauá bank, established

in 1858, was the first private bank in the city; the London and River Plate bank (1868) does a large business; the Argentine bank was more recently established, and there are also several private banking houses, one of which furnished a loan to the national government in June, 1871, engaging to discount \$6,000,000 in national funds, at the rate of 7 per cent. The militia and national guard of Buenos Ayres number 19,867 men. Ten daily papers are published in the city: six in Spanish, and one each in English, French, German, and Italian. More than 40,000 immigrants landed at Buenos Ayres in 1871; and in March, 1872, 1,200 landed in a single day. The total number of immigrants in the latter year was about 45,000; and 100,000 were confidently expected for 1873. The provincial and national governments have their seat together in Buenos Ayres. The municipal government is composed of 12 leading citizens and foreign residents. The city is divided into parishes, each having a justice of the peace.—The mouth of the Plata was discovered in 1512, by Don Juan Díaz de Solís, and Buenos Ayres and several other colonies were founded as early as 1535 by Mendoza; but the Indians having put the new colonists to flight, it was not till 1580 that the Spaniards under Don Juan de Garay took final possession of the present site of the city, and began to establish settlements, which were soon attached to the viceroyalty of Peru. In 1620 Buenos Ayres was erected into a bishopric; a new government was formed, called the government of the Rio de la Plata, which continued dependent upon the viceroyalty of Peru till 1776, when the Platine provinces became the seat of a viceroyalty, of which Buenos Ayres was the capital. It fell into the hands of the British in 1806, but was soon retaken by the Spaniards; and in a second attempt in 1807 to capture the city, the English met with still less success. In 1810 began the war of independence, which after six years resulted in the formation of the Platine provinces into an independent state, July 9, 1816, Buenos Ayres still continuing to be the capital. The new confederation was called the United Provinces of La Plata. But the exclusive policy of the capital soon induced discontent in the provinces, which demanded a federation instead of the central government of Buenos Ayres. A civil war broke out, ending in the formation of the Argentine Confederation in 1831. In the midst of these internal dissensions, the port of Buenos Ayres was blockaded by a Brazilian fleet; but the blockade was raised in 1818 by the intervention of the British. The peace established in 1831 was of short duration; civil strife soon again manifested itself, and was but temporarily checked by the accession of Rosas to the supreme power in 1835. The new governor soon involved the country in a foreign war, in the course of which the fleet of Buenos Ayres was seized by

the united fleets of England and France, and the navigation of the Paraná opened to the vessels of all nations. Rosas was succeeded in 1852 by Urquiza, against whom Buenos Ayres rebelled, and was again besieged by the confederate forces in 1853. A temporary accommodation was effected in June of the same year; but new troubles soon arose, and continued with little intermission until the final defeat of the Argentine forces by Gen. Bartolomé Mitre, Sept. 17, 1861. The following year Buenos Ayres again entered the Argentine Republic, and was appointed the provisional capital, Mitre having in the mean while been elected president. A bill proposing the removal of the seat of government to Rosario, in the province of Santa Fé, was vetoed by President Mitre in 1868, and again by his successor, President Sarmiento. Buenos Ayres was visited in 1871 by yellow fever, when for three months business was suspended, and many of the citizens fled to the rural districts. The total number of deaths up to April 30, according to official report, was over 13,000; but this number is regarded as far below the truth.

BUFFALO, the name of two species of the true oxen, as distinguished from the bisons, to which they bear but a faint resemblance, though they are included with them in the genus *bos* (Linn.). The general characteristics of the buffalo are conical horns, inclining successively outward, downward, backward, upward, and forward, with their tips on a plane above and a little in front of the top of the forehead; forehead convex, and longer than broad; the intermaxillary bones elongate, shelving back, and giving prominence to the nasal bone. This animal must not be confounded with the American bison (*bos Americanus*), which is almost universally called the



Indian Buffalo (*Bos bubalus*).

buffalo, its furry hides being styled buffalo robes. The two species of the true buffalo are the *bos bubalus* (Linn.) of India and the *bos Caffer* (Sparm.) of South Africa. They are

called on both continents simply the buffalo, but are separated zoologically as the Indian and Cape buffalo. These two species form the genus *bubalus* of some naturalists. In India, the buffalo is again subdivided into the tame and the wild, although they are both of the same species. Mr. B. H. Hodgson thus speaks of them: "The bhainsa, or tame buffalo, is universal in India. The arna, or wild buffalo, inhabits the margins rather than the interior of primeval forests. They never ascend the mountains, and adhere, like the rhinoceros, to the most swampy sites of the district they inhabit. There is no animal upon which ages of domesticity have made so small an impression as upon the buffalo, the tame being still most clearly referable to the wild ones, frequenting all the great swampy jungles of India. The arna ruts in autumn, gestating ten months, and produces one or two young in summer. It lives in large herds, but in the rutting season the most lusty males lead off and appropriate several females, with which they form small herds for the time. The wild buffalo is fully a third larger than the largest tame breeds, measuring 10½ ft. from snout to vent, and 6 or 6½ ft. high at the shoulders, and is of such power and vigor as by his charge frequently to prostrate a good-sized elephant. It is remarkable for the uniform shortness of the tail, which does not extend lower than the hock, for the tufts which cover the forehead and knees, and lastly for the great size of its horns. They are uniformly in high condition, so unlike the leanness and angularity of the domestic buffalo even at its best." The arna variety is known to naturalists as the *bos arni*. Its horns, which grow out horizontally from either side of a flattened frontal bone, rise in a regular crescent upward and backward until near the point, when the tips, which are nearly equidistant with the bases, turn slightly forward. The bases of the horns, which are flattened and deeply corrugated in irregular rings through three fourths of their length, and smooth only at the points, often measure each upward of 18 inches in circumference, while their length, taken along the outer curve, has been known to exceed 5 ft. in either horn, and to include a distance of 10 ft. from tip to tip. Its covering consists of smooth, short, thin hair, resembling the bristles of a hog more than the coat of the ox family. It is addicted to wallowing in the mud, is fierce and vindictive, and in its native jungles is more than a match for the Bengal tiger, which never attacks it unprovoked. This buffalo was introduced into Egypt, Greece, and Italy during the middle ages. Its great strength makes it peculiarly adapted for draught; its milk is good, its skin highly valued, but its flesh is much inferior to that of the ox. It prefers marshy and even malarious places and coarse plants.—The Caffer or Cape buffalo of Africa has very large, black horns, placed close together and flattened at the base, broad, rough, and sinuously ringed, covering the whole front

h a sort of horny helmet, with a smooth curved upward and inward. Its horns are horizontal in position than those of the a, which are sometimes elevated two feet



Cape Buffalo (*Bos Caffer*).

ve the frontal bone. It has pendent ears and dewlap, skin with dark, stiff hairs about inch long, and, though of massive proportions and extremely ferocious, has neither the might nor the activity of its Indian congener. Both species lack the hump and mane characteristic of the bison. The Cape buffalo is a native of South Africa; it congregates in immense herds, but the old bulls, which become gray, and are often almost destitute of hair, sometimes adopt solitary habits, when they grow very savage, attacking both men and animals in mere wantonness, trampling and kneeling on the carcasses and crushing them with their massy horns and frontlets, until every bone is broken. This animal also delights to wallow in the mire, and when attacked by hunting plunges into the first pool, in which he wholly submerges himself, allowing only the extremity of his muzzle to protrude. All travellers dwell on the loud bellow which he utters in the death agony.—There is an Indian wild bull (*bos gaunis*), little known, which appears to be intermediate between the bison and buffalo. Gen. Hardwicke and Capt. Rogers describe it as a genuine bull, neither bison nor buffalo; but Major Walter Campbell, the author of the "Old Forest Ranger," who gives a full description of this rare animal, which he calls the jungle *roolgha*, makes it nearly a bison. From the character of its horns, which resemble those of the Cape buffalo in form, though they have not the horny helmet over the brow, and of its hump, supported by hump ribs, and of its mane, it is presumed that, on further investigation, it will be elevated into a distinct genus. (See Bison.) **BUFFALO.** I. A W. county of Wisconsin, separated on the W. from Minnesota by the Mississippi, and bounded N. W. by Chippewa river, S. E. by Trempeleau Mountain river and Eagle river; area, 650 sq. m.; pop. in 1870, 123. The La Crosse, Trempeleau, and Pres-

cott railroad is to pass through it. The chief productions in 1870 were 567,164 bushels of wheat, 195,872 of Indian corn, 816,883 of oats, 44,912 of barley, 65,885 of potatoes, 16,477 tons of hay, 264,885 lbs. of butter, and 28,830 of wool. There were 3,028 horses, 8,871 milch cows, 9,443 other cattle, 5,926 sheep, and 6,740 swine. Capital, Alma. II. A S. W. county of Nebraska, bounded S. by Platte river, and intersected by the South branch of Loup fork, Prairie creek, and other branches of the Platte; area, 2,000 sq. m.; pop. in 1870, 193. The Union Pacific railroad passes through the S. part. The chief productions in 1870 were 5,400 bushels of Indian corn, 640 of oats, 880 of potatoes, and 490 tons of hay. III. A S. E. county of Dakota, bounded W. by the Missouri river; area, about 750 sq. m.; pop. in 1870, 246. The value of farm products was \$1,600; of live stock, \$3,600. As first organized, it occupied an extensive area, bounded N. by British America, S. W. and W. by the Missouri river, having Montana for a part of its N. W. boundary, and comprising a large portion of the "Plateau du Coteau du Missouri," and a part of the Miniwakan or Devil's lake. This region is watered by many streams.

BUFFALO, a city, port of entry, and the capital of Erie county, N. Y., at the E. extremity of Lake Erie, at the head of Niagara river, and at the mouth of Buffalo river (formerly called Buffalo creek), in lat. 42° 53' N., lon. 58° 55' W., about 265 m. W. of Albany and 298 m. N. W. of New York. The site is a plain, which from a point about 2 m. distant from the lake slopes gently to the water's edge. The uplands command an extensive prospect of the lake and river, and afford beautiful situations for suburban residences. The city has a water front of about 2½ m. on the lake, and of the same extent on Niagara river. A portion of the river front is a bold bluff 60 ft. high. Buffalo has one of the finest harbors on the lakes. It is formed by the Buffalo river, a small stream, which is navigable for one mile from its mouth. The entrance is protected by a breakwater which is 1,500 ft. long, upon the S. side of the river. A breakwater has likewise been constructed in Niagara river upon the N. side of Buffalo river, by which a new and capacious harbor has been made. In 1869 the United States government began the construction of a capacious outside harbor by building a breakwater designed to be 4,000 ft. long, fronting the entrance to Buffalo river, at the distance of about half a mile from the shore. Nearly half of the breakwater had been completed in 1872. In addition, there is a large number of slips and basins for the accommodation of shipping and canal boats. The entrance to the harbor and the approaches from the river are defended by a small fortification called Fort Porter, situated on the heights N. of the city.—Buffalo ranks 11th in point of population among the cities in the United States. The rapid increase of population is shown as

follows: 1810, 1,508; 1820, 2,095; 1830, 8,653; 1840, 18,218; 1850, 42,261; 1860, 81,129; 1870, 117,714. Of the total population in 1870, 71,477 were of native and 46,237 of foreign birth; of the latter, 22,249 were born in Germany, 11,264 in Ireland, 4,554 in England and Scotland, 4,174 in British America, 2,232 in France, and 612 in Switzerland.—Buffalo has many attractions as a place of residence. Its summer climate is delightful; an almost perpetual breeze from the west fans the eastern shore of Lake Erie. The average mean temperature of the three summer months for five years from 1867 to 1871 was 70.8° F. The average mean temperature of the year for the same period was 47.98°. According to a report on vital statistics for 1872, Buffalo was the healthiest city in the United States, the death rate being only 18.9 per 1,000. The streets are generally broad, lined with shade trees, and cross each other at right angles. The plan of the city introduces many squares and public places. The private residences are generally neat and tasteful. The business portion lies near the lake and river. A superb public park, or system of parks, has been designed and laid out by Frederick Law Olmsted, the architect of the Central park in New York city. The land taken for park purposes embraces about 530 acres; it is divided into three plots situated in the western, northern, and eastern parts of the city, with broad boulevards connecting them, forming a continuous drive of nearly 10 miles. The construction of the park was begun in 1871. The prominent public buildings are: the United States custom house and post office, a large freestone edifice of plain style, at the corner of Washington and Eagle streets, in which also the United States district court is held; the state arsenal, a handsome turreted structure of stone, in Batavia street; the Erie county penitentiary, a capacious building of brick and stone; the state armory, in Virginia street, a large plain edifice of brick; and the general hospital, of which only one wing has yet been erected. The most notable church edifices are St. Paul's cathedral (Episcopal), fronting Pearl street, built of red sandstone in the early English style; and St. Joseph's cathedral (Roman Catholic), in Franklin street, of blue stone with white stone trimmings, in the ornamental Gothic style, and having a chime of 42 bells. Several of the bank buildings of the city are costly and imposing edifices, especially those of the Erie County, the Buffalo City, and the Western savings banks. A court house and city hall of granite, fronting Franklin street, is in process of construction, which will cost nearly \$1,000,000. The state has undertaken the erection of an asylum for the insane at Buffalo, the corner stone of which was laid in 1872; it is designed to be the largest institution of its kind in the United States, if not in the world. The building will have a front of about 2,700 ft. The grounds attached to it embrace 208 acres, and are laid out in harmony with the

plan of the Buffalo park, which they adjoin. The construction of a bridge across the Niagara river was completed in 1878. Four of the principal streets of the city, Main, Niagara, Genesee, and Batavia, have horse railroads, which are under the control of one company. The Main and Niagara street lines are each about 4 m. long and have double tracks. Buffalo is the western terminus of the Erie canal, and of the New York Central railroad and two of its branches to Niagara Falls and Lockport; it is the main western terminus of the Erie railway, with a branch road from West Corning and one to Niagara Falls. It is the eastern terminus of the Lake Shore and Michigan Southern railway; of the Buffalo and Lake Huron branch of the Grand Trunk railway of Canada; and of the nearly completed Canada Southern railway, and "loop line" of the Great Western railway of Canada. The Buffalo, New York, and Philadelphia, and Buffalo, Jamestown, and Titusville railroads will give the city direct connections with middle and western Pennsylvania; and the Midland and the New York and Chicago air-line railroads, now in progress, will both be added in a few years to the railroad system of which Buffalo is the focus.—The position of Buffalo at the foot of the great chain of lakes gives it a marked commercial importance. The board of trade was established in 1844 and incorporated in 1857. For many years the business of the city was almost wholly confined to shipping and forwarding. Since about 1862, however, its lake and canal commerce has declined in relative importance, owing to the increased traffic of the railroads; and manufacturing enterprise has taken the lead. The grain trade of Buffalo forms the most important item of its commerce. The facilities for handling and storing grain are unsurpassed. The first grain elevator built on the lakes was erected at Buffalo by Joseph Dart in 1843. In 1873 there were 32 elevators at the port with an aggregate storage capacity of 7,415,000 bushels, and with a capacity for transferring 2,883,000 bushels per day. Many of these elevating warehouses are costly structures of stone, or of iron and brick, or of wood with corrugated iron sheathing. The following table shows the receipts of flour and grain for 1871:

ARTICLES.	By Lake and G. T. Railway.	By Lake Shore Railway.	Total.
Flour, bbls.....	1,273,077	1,437,736	2,710,813
Wheat, bush.....	22,606,317	1,379,000	23,985,317
Corr. bush.....	26,110,769	10,236,000	36,346,769
Oats, bush.....	9,006,409	5,674,850	14,681,259
Barley, bush.....	1,946,923	204,300	2,151,223
Rye, bush.....	1,065,089	98,300	1,163,389
Total grain, bush....	60,765,857	17,612,850	78,378,707
Equivalent of flour....	6,890,085	7,198,630	14,088,715
Grand total, bush....	67,655,942	24,811,480	92,467,422
" " 1872....	62,260,832	23,000,000	85,260,832

The aggregate receipts of grain (including flour) by lake at Buffalo in each decade, from 1836 to

1872, were as follows: 1886 to 1845, 41,851,493 bushels; 1846 to 1855, 174,717,497; 1856 to 1865, 432,390,318; 1866 to 1872, 379,207,797. The shipments of grain and flour by canal for four years ending 1872 were as follows:

ARTICLES.	1869.	1870.	1871.	1872.
Flour, bbls.	51,928	76,471	47,781	5,172
Wheat, bush.	16,368,480	16,783,618	19,028,816	11,001,069
Corn, bush.	7,816,960	5,911,668	20,695,305	30,984,606
Oats, bush.	8,938,046	5,572,254	6,649,489	4,598,287
Barley, bush.	52,429	890,024	825,420	1,729,772
Rye, bush.	76,792	873,829	986,517	210,705
Total grain, bus.	28,392,707	29,430,881	48,184,997	48,474,889
Equiv. of flour.	250,640	885,855	288,655	25,860
Total.	28,582,347	29,318,236	48,422,652	48,500,249

The exports of grain from elevators by the Erie and New York Central railroads for two years were:

ARTICLES.	1871.	1872.
Wheat, bush.	2,636,170	2,440,551
Corn, bush.	4,320,591	3,082,160
Oats, bush.	1,636,713	1,227,947
Barley, bush.	416,001	896,082
Rye, bush.	18,750	4,825
Total.	9,045,140	7,100,865

Including the amount shipped by railroad without passing through the elevators, about 25,000,000 bushels, the total exports of grain amounted to 82,235,000 bushels in 1871 and 80,575,254 in 1872. The imports and exports by canal in 1872 were:

ARTICLES.	IMPORTS.		EXPORTS.	
	Tons.	Value.	Tons.	Value.
Forest products.	8,467	\$40,006	847,659	\$13,626,415
Animal "	187	63,887	52	17,219
Agricultural "	2,887	122,441	1,824,441	38,497,543
Manufactures	101,513	8,026,151	564	62,769
Merchandise.	161,560	25,431,107	867	126,611
Other articles.	430,846	8,490,798	101,982	5,542,194
Total, 1872.	689,916	32,178,888	1,774,996	52,355,587
" 1871.	583,568	28,124,220	1,742,157	69,466,029
" 1870.	583,849	29,591,601	1,808,904	87,388,208

The traffic in live stock which centres at Buffalo, from the western states and from Canada, is second in magnitude only to the grain trade, and is increasing more rapidly. Large yards, well sheltered, paved, and watered, and cleanly kept, have been built in the eastern suburbs of the city, by the New York Central railroad company, for the accommodation of this traffic. The receipts for a series of years were:

YEARS.	Cattle.	Sheep.	Hogs.	Total No.	Total value.
1890.	156,972	145,854	85,770	388,606	.....
1889.	154,759	474,849	91,128	720,736	.....
1888.	212,899	207,908	800,014	720,821	.....
1887.	275,091	341,560	552,891	1,169,542	.....
1886.	257,872	239,943	607,440	1,105,255	.....
1885.	265,105	335,515	470,575	1,121,195	.....
1884.	347,871	381,450	794,272	1,523,593	\$47,392,000
1883.	388,057	561,447	799,519	1,648,023	51,545,116
1882.	384,294	551,191	886,014	1,821,499	47,560,985
1881.	379,086	606,748	1,450,109	2,435,943	45,914,598

The receipts of horses during 1868 were 7,787; 1869, 12,088; 1870, 7,896; 1871, 13,819; 1872, 20,780. Yearly increasing quantities of anthracite and bituminous coal from the Pennsylvania mines are brought to Buffalo as the most favorable point for shipment and distribution, both westward and eastward. Extensive improvements have been made by the Delaware and Hudson canal company, and by the Buffalo Creek railway company, to facilitate the transshipment of coal; and the greater part of the peninsula south of Buffalo river is now occupied for the purpose. The receipts and shipments of coal for ten years were:

YEARS.	Received by Lake.	Received by Canal.	Received by Railroad.	Shipped by Canal.
1862.	84,528	96,772	.....	28,947
1863.	71,823	135,770	.....	20,125
1864.	65,224	189,451	.....	30,048
1865.	68,141	196,290	.....	28,288
1866.	68,142	810,888	.....	50,202
1867.	101,108	290,842	.....	57,495
1868.	91,457	391,949	.....	59,766
1869.	99,460	221,856	227,000	62,690
1870.	94,796	340,464	300,000	65,900
1871.	88,517	187,546	360,000	60,522
1872.	78,879	286,494	496,000	58,198

Of the total receipts in 1872, 520,994 tons were anthracite, 240,379 bituminous, and 100,000 semi-bituminous coal. The coal trade of Buffalo will be largely increased by the completion of the Buffalo, New York, and Philadelphia railroad, which was opened to the Pennsylvania state line in the summer of 1872, and was terminated in December, 1872, at Emporium, on the line of the Philadelphia and Erie railroad. It will be still further augmented by a new railroad commenced in 1872, from Buffalo to Titusville, via Jamestown, which will form a direct connection with the railway system of western Pennsylvania. The lumber and timber trade of Buffalo is of considerable importance, although want of harbor and storage room has driven much of it to Tonawanda, on the Niagara river, about ten miles below Buffalo. The imports and exports in 1872 were:

ARTICLES.	Imports by Canal.	Imports by Lake.	Exports by Canal.
Lumber, ft.	1,481,791	204,976,754	147,519,461
Timber, cub. ft.	811,200	.....	4,200,000
Shingles, No. ....	.....	16,089,800	21,173,000
Staves, lbs.	12,000	(No.) 22,647,000	(lbs.) 196,803,895

The following is an official report of the tonnage of the district of Buffalo Creek, port of Buffalo, June 30, 1872:

CLASSES.	No.	Tonnage.
Sailing vessels.	95	85,273
Steam "	120	49,975
Barges.	12	2,728
Canal boats.	499	57,187
Total.	726	145,116

There has been a marked decrease in the number of vessels entering and clearing at this

port since 1862. In that year the total number of entrances and clearances was 16,890; in 1864, 14,105; in 1866, 18,528; in 1868, 11,744; in 1870, 10,625; and in 1872, 10,803. The entrances and clearances for the year ending Dec. 31, 1872, were:

	ENTERED.		CLEARED.	
	No.	Tons.	No.	Tons.
Foreign Ports:				
American vessels.	744	466,168	706	464,559
Foreign ..	449	50,591	435	49,766
Coastwise	2,985	1,800,790	4,084	1,846,789
Total.....	5,128	2,817,544	5,175	2,860,514

The total value of the imports from Canada for the year ending June 30, 1872, was \$2,625,998; domestic exports, \$328,843; foreign exports, \$8,993. In 1870 Buffalo was made a port of entry for imports from Europe which are transported in bonded cars from eastern seaports.—Since about 1860 the manufacturing interests of Buffalo have been rapidly increasing, manufactures of iron taking the lead. Among the iron-making and iron-working establishments in operation in 1871 were 3 blast furnaces, 2 large rolling mills, 1 nail manufactory, 16 engine works, 5 boiler works, 4 stove and hollow ware foundries, 4 steam forges, 4 manufactories of bolts and nuts, 1 car wheel foundry, 1 chain manufactory, 3 edge tool factories, 1 malleable iron foundry, 1 saddlery hardware factory, 3 builders' hardware factories, 1 iron pipe foundry, 3 general foundries, 1 scale factory, and 2 safe factories, employing altogether over 5,000 men. There were also 18 tin, copper, and sheet-iron manufactories, 5 brass foundries, 5 manufactories of agricultural machinery, 37 furniture and furniture frame factories, 40 carriage and wagon shops, 5 railroad car shops, 10 boot and shoe factories, 11 tanneries, 14 barrel factories, 1 starch factory, and many other manufacturing establishments. Malting and brewing, for which the climate and situation of Buffalo are highly favorable, are extensively carried on. In 1871, 41 breweries produced 176,299 barrels of beer, ale, and porter; and 5 distilleries distilled 1,583,187 gallons of highwines from 437,267 bushels of grain. The number of malting houses (exclusive of those attached to breweries) was 25, with an aggregate capacity for malting 1,250,000 bushels per annum. In 1872, 11 flour mills, with a yearly capacity of 878,000 barrels of flour, were in operation; and there were three gas-light companies, one of which first brought into public use in the United States the oxygen and hydrogen gas light.—Wooden ship building, which was formerly largely carried on at Buffalo, has much declined, but iron ship building is rising into importance. Two of the large iron works of the city have so far constructed all the iron steam vessels that have been put upon the lakes, including 10 of the largest and finest

steamers afloat, and have also constructed several iron revenue cutters for government service on the Atlantic coast. In 1872 there were built 54 vessels of 9,645 tons, including 29 canal boats of 3,586 tons. In 1873 Buffalo contained 8 national banks, with an aggregate capital of \$550,000; 6 state banks acting under special charters, with a capital of \$1,950,000; and 5 savings banks, 4 of which had an aggregate of 46,844 depositors and \$13,828,491 deposits. The city is provided with 3 commodious and handsome market houses, each of which is the centre of a busy trade.—The government is vested in a mayor, a common council comprising 26 members, 2 from each of the 13 wards, a comptroller, city attorney, street commissioner, treasurer, superintendent of education, city engineer, overseer of the poor, and 3 assessors, all of whom are elected by the people for a term of two years. The president of the council, the comptroller, and the city engineer constitute a board of health. The police department, under the control of a board of three commissioners, of which the mayor is the head, comprises a force of 174 men. The fire department consisted in 1873 of 8 steam fire engines, 6 hose companies, 3 volunteer hook and ladder companies, and 1 volunteer protection company. The fire alarm telegraph comprised 70 m. of wire, 68 signal stations, and 27 alarm gongs. The water works are under the control of a board of three commissioners. Water is obtained from the Niagara river through a tunnel which penetrates nearly to the middle of the river. In 1873, 67 m. of street mains had been laid. The elevated parts of the city are supplied by forcing machinery on the Holley system, which was brought into use in 1870. The total debt of the city in 1872 was \$4,450,659; the property of the city was valued at \$3,442,287. The total expenditures for the year were \$1,545,051, including a general tax of \$1,042,612, and \$502,419 from local assessments. The assessed valuation of property subject to taxation, about one third of the actual value, has been:

YEARS.	Real.	Personal.	Total.
1866.....	\$25,492,000	\$6,517,410	\$32,009,410
1867.....	25,583,210	7,790,080	33,373,290
1868.....	23,807,940	10,753,175	34,561,115
1869.....	22,859,788	7,154,475	30,014,263
1870.....	20,289,315	7,850,585	28,139,900
1871.....	20,888,580	6,547,375	27,435,955
1872.....	21,990,085	6,947,775	28,937,860

The charitable institutions of the city are numerous. The Buffalo orphan asylum (Protestant), organized in 1835, is provided with a commodious and well arranged building in Virginia street. The St. Vincent's female orphan asylum (Catholic), corner of Batavia and Ellicott streets, is under the care of the Sisters of Charity, who also superintend a capacious and well fitted hospital in Main street, adjacent to the Buffalo medical college. The St. Joseph's boys' orphan asylum, at Lund-



Buffalo, from the spire of the Presbyterian Church in Delaware street.

stone hill, is another large establishment founded by the Roman Catholic church. Connected with it is a reformatory institution of excellent character and reputation. The church charity foundation (Episcopal) in Rhode Island street, near Niagara, embraces a home for aged and destitute females founded in 1858, and an orphan ward opened in 1866. The St. John's orphan home at Sulphur Springs, in the suburbs of the city, founded in 1865, is under the auspices of the Evangelical Lutheran church. The Ingleside home, a well sustained charity, with an excellent building in Seneca street, presented by George W. Tefft, is designed for the reclamation of erring women, and has been very successful since the organization in 1869. The home for the friendless in Seventh street, near Maryland, gives assistance to girls and women who are friendless and strangers in the city. Among other important charities may be mentioned the St. Mary's deaf mute asylum (Catholic) and the St. Mary's asylum for widows, foundlings, and infants (Catholic), in Edward street; the Magdalen asylum (Catholic), in Best street; the Providence insane asylum (Catholic), in Main street; the St. Francis hospital, in Pine street; the Buffalo general hospital, in High street; the Firemen's benevolent association; the Hebrew union benevolent association; the Buffalo association for the relief of the poor; the St. George's benevolent society; the United Evangelical St. Stephen's benevolent society; the machinists' and blacksmiths' benevolent association; two allopathic and one homœopathic free dispensary; and a homœopathic hospital, founded in 1872.—The public schools are under the charge of a superintendent of education. The city is divided into 86 school districts, each

containing a graded school, to several of which one or two subordinate primary schools are attached, making altogether 43 district schools. Four public orphan asylum schools are also maintained. On completing the course of study in the graded schools, pupils may enter the central school, a large academic institution, in which the sciences, the classics, and modern languages are taught. In 1872 the total number of teachers in the public schools was 353; pupils, 21,808; average term registration, 14,525. During most of the autumn and winter months evening schools are maintained in 10 or 12 of the public school buildings, and are attended by 2,000 to 2,500 pupils. The state has established here a normal school, which was opened in 1871. Canisius college, founded by the Jesuit fathers in 1870, affords instruction in the higher range of classical and philosophical studies. In September, 1872, a handsome new building, constructed of brick with stone facings, was opened in Washington street, near Tupper. In 1872 there were 12 instructors and 86 students in the collegiate department. A preparatory and an elementary school are connected with the college. St. Joseph's college, on the terrace in the rear of St. Joseph's cathedral, conducted by the Christian Brothers, had 400 pupils in 1873. On the same square, in Franklin and Church streets, is the St. Mary's academy and industrial school for girls, which had 295 pupils in 1873. The Heathcote school, in Pearl street, is a classical academy established under the patronage of the Protestant Episcopal church. The Martin Luther college is a small seminary for the education of young men intended for the ministry in the Lutheran church. The medical college of the university of Buffalo,

the Buffalo female academy, and the academy of the Holy Angels (Roman Catholic) are among the other educational institutions of the city. The young men's association has a circulating library of more than 25,000 volumes, and owns real estate valued at from \$150,000 to \$200,000, including St. James hall, the most popular audience room in the city, in which the regular winter lectures of the association are held. The large library building of the association, adjacent to the hall, is also occupied by the Buffalo historical society, the society of natural sciences, the academy of fine arts, and the mechanics' institute. The historical society has accumulated a large library and cabinet. The society of natural sciences possesses a very complete and valuable collection of minerals, presented by Charles Wadsworth, a good botanical and conchological cabinet, and a complete set of Prof. Ward's fossil casts. The academy of fine arts has been put upon a firm footing by a recent endowment, and is rapidly founding a very fine gallery of painting and sculpture. The mechanics' institute is building up a good library, and is in a flourishing condition. The young men's Christian union, the German young men's association, and the Catholic young men's association are founding libraries for the use of their members. The Grosvenor library is a public library for reference, founded by a bequest of Seth Grosvenor of New York. It was opened in 1871, and contained in 1878 about 10,000 volumes, chiefly important books not easy of access elsewhere. The foundation fund of the library is ample to make it in a few years one of the foremost of its character in the country.—There are published in the city 9 daily newspapers, 5 in English and 4 in German; 10 weeklies, of which 3 are religious and sectarian; and 7 monthlies. There are 76 churches, viz.: 18 Roman Catholic, 11 German Lutheran and Evangelical, 10 Episcopal, 10 Methodist, 9 Presbyterian, 8 Baptist, 4 Mission, 2 Jewish, 1 French Protestant, 1 Unitarian, 1 Universalist, and 1 Friends'. The Forest Lawn cemetery, in the suburbs of the city, contains 75 acres.—Buffalo was founded by the Holland land company, which owned a large tract of land in western New York, in 1801. It became a military post in 1812 during the war between the United States and England, and in 1814 was burned by a force of Indians and British. After the close of the war the village was rebuilt, and it was incorporated as a city in 1832. Its growth was not rapid until the opening of the Erie canal in 1825, which gave a great impetus to western emigration, to the settlement and development of the northwest, and to travel and traffic on the lakes. Buffalo then became the distributing centre of the trade between the east and the west. In 1853 Black Rock, a village on the Niagara river 2 m. below Buffalo, was incorporated with it.

BUFFIER, Claude, a French author, born in Poland of French parents, May 25, 1661, died

in Paris, May 17, 1737. He was educated at Rouen, entered the society of Jesus in 1679, and spent the greater part of his life in teaching at the collège Louis le Grand. His principal writings on grammar, literature, science, and theology are found in his *Cours de sciences et des principes nouveaux et simples* (Paris, 1722), the most esteemed being the *Traité des premières vérités*. A separate edition of his remarkable *Grammaire française sur un plan nouveau* appeared subsequently. The *Encyclopédie méthodique* appropriated many of his writings without credit. He wrote various historical and other works, and in his *Pratique de la mémoire artificielle* (4 vols., Paris, 1701-'15) he applied Lancelot's method to the study of chronology, history, and geography.

BUFF LEATHER, a strong soft preparation of bull's or elk's hide, which was worn under the mail armor of the middle ages, to deaden the effect of a blow. As armor fell into disuse, buff coats, which would turn a broadsword cut and even a pistol ball, were often worn instead of complete steel, either with or without cuirass and gorget of metal. Modern buff leather, of which soldiers' crossbelts and other accoutrements are frequently made, is for the most part made of common buckskin.

BUFFON, Georges Louis Leclerc, comte de: French naturalist, born at Montbard, in Burgundy, Sept. 7, 1707, died in Paris, April 17, 1788. He was the son of Benjamin Leclerc, counsellor of the parliament of Dijon, and was educated for the bar. At the age of 20 he joined a young English nobleman, the duke of Kingston, who was travelling with his tutor. They visited many parts of France, Switzerland, and Italy, during a period of 18 months; and from this time Buffon resolved to devote himself to the pursuit of science. He visited London, where he studied English, and translated Newton's treatise on fluxions from the Latin, and Hales's "Vegetable Statics" from the English. The two manuscripts were presented to the academy of sciences of Paris and favorably received, the first being printed in 1735, and the second in 1740, with the approbation of the academy. In 1739 he was elected member of the academy of sciences, and during the same year appointed director of the *jardin du roi*, now the *jardin des plantes*. This appointment called his attention more exclusively to natural history, and he resolved to continue the work commenced by Aristotle and Pliny, in describing the organic and inorganic forms of nature on our globe. With this view he enlisted the coöperation of Daubenton in the anatomical and scientific portions of the work, reserving to himself the external forms, habits, instincts, and geographical distribution of the animal kingdom. Daubenton and Buffon worked together diligently sixteen years, and in 1749 the first three volumes of the "Natural History" appeared, twelve more volumes following at intervals between 1749 and 1767. Few works have ever met

with such success; the study of natural science, and particularly natural history, became universally attractive. Buffon's "Theory of the Earth" enlisted numerous admirers among the more imaginative readers of his works, but was rejected by those of cooler judgment. His general views of the animal creation and the natural history of man were more successful, and his ideas of the relation between form and substance have been demonstrated scientifically by the experiments of Flourens on the gradual appearance and disappearance of coloring matter in the bones of living animals. "That which is the most constant and unalterable in nature," says Buffon, "is the type or form of each species; that which is the most variable and corruptible is the matter or the substance which clothes the form;" and this has been experimentally proved by Flourens, in addition to the evidence of daily nutrition and loss of substance in every individual organism. Buffon's eloquent description of the gradual development of the human organism, and the concomitant unfolding of sensation and the faculties of thought and reason, is a masterpiece of observation and delineation. The first class of animals described by Buffon was the quadrupeds; the second, birds; and here, with regard to the animal kingdom, his labors ceased. The "History of Domestic Animals" was published between 1753 and 1756; that of the carnivorous tribes and other wild species between 1758 and 1767, describing more than 3,000 species and varieties. The "History of Birds" was published between 1770 and 1781. Daubenton then retired from the work, and Buffon obtained the coöperation of Guéneau de Montbéliard, the abbé Bexon, and Sonnini de Manoncourt. The "History of Minerals" was published between 1783 and 1785, and the "Epochs of Nature" in 1788. The style is always good, and the illustrations rich with imagery, but the theories become more and more hypothetical and vague. His ideas, however, paved the way for his successors, Cuvier and Geoffroy Saint-Hilaire, who laid the foundations of true science in these branches of investigation. The mind of Buffon was not so analytical and accurate as that of Cuvier; not so keen in the perception of remote relations between normal and abnormal types of organism as that of Geoffroy Saint-Hilaire; but he had more poetical views of truth and beauty than either, and deeper intuitions of the unitary laws of nature, physical, instinctual, and rational. His works have been reprinted many times in France, and rendered into most of the languages of Christendom. The best edition of the *Histoire naturelle* was issued from the royal printing establishment in 36 vols. 4to, 1749-88. There is an edition from the same press in 78 vols. 12mo, begun in 1752, with a continuation in 17 vols. by Lacépède. There is an abridgment by Castel, in 26 vols. 18mo. —Buffon left one son, HENRI LÉONARD, born in 1764, who erected a monument to his father in

the gardens of Montbard, and who died by the guillotine during the revolution.

BUG. See HEMIPTERA.

BUG. I. A river of western Russia, rises in Galicia, flows N. and N. W., forming for a considerable distance the E. boundary of the Russian kingdom of Poland, then enters Poland, flows S. W., and after receiving the Narew falls into the Vistula, 18 m. N. W. of Warsaw. Its entire course is upward of 300 m., and it is navigable for some distance, although shallow in summer. II. A river of southern Russia, more properly called Bog, rises in the north of Podolia, pursues a S. E. course of about 400 m., and below Nikolayev falls into the estuary of the Dnieper, which opens into the Black sea. It is navigable as far as Vosnesensk, about 75 m. from its mouth; above that point it is obstructed by rocks and sand banks.

BUGEAUD DE LA PICONNERIE, Thomas Robert, duke of Isly, a French soldier, born at Limoges, Oct. 15, 1784, died in Paris, June 10, 1849. He entered the French army as a private in 1804, became a corporal in 1805, served as sub-lieutenant in the campaign of Prussia and Poland (1806-'7), was present in 1810 and 1811 as major at the sieges of Lerida, Tortosa, and Tarragona, and was promoted to the rank of lieutenant colonel after the battle of Ordal in Catalonia. After the return from Elba Napoleon sent him to the army of the Alps in command of a regiment, which formed the advance guard of Suchet's corps. On the second return of the Bourbons he retired to a rural estate of his father. At the time of the invasion of Spain by the duke of Angoulême in 1823, he offered his sword to the Bourbons, but the offer being declined, he joined the opposition movement which finally led to the revolution of 1830. He was chosen a member of the chamber of deputies in 1831, and made a general of division by Louis Philippe. Appointed governor of the citadel of Blaye in 1833, he had the duchess of Berry under his charge, and afterward became known by the name of the "ex-jailer of Blaye." He commanded one of the brigades by which the Paris insurrection of April 18-14, 1834, was suppressed, and became obnoxious to the populace. He was sent in 1836 to Algeria, where he concluded the treaty of the Tafna, and in 1841 became governor general. The battle of Isly (Aug. 14, 1844), in which he vanquished the army of the emperor of Morocco with vastly inferior forces, owed its success to his taking the enemy by surprise, without any previous declaration of war, and when negotiations were on the eve of being concluded. Already raised to the dignity of a marshal of France, July 17, 1843, Bugeaud was now created duke of Isly. Abd-el-Kader having after the marshal's return to France again collected an army, Bugeaud was sent back to Algeria, where he promptly crushed the revolt. In consequence of differences between him and Guizot, occasioned by his expedition into Kabylia, he was superseded

by the duke d'Aumale. At the beginning of the revolution of 1848 Louis Philippe, in the night of Feb. 22-23, conferred upon him the supreme command of the whole armed force of Paris. The national guard, incensed by this appointment, broke out with the cry of "Down with Bugeaud!" and declared that they would not obey his orders. Frightened by this demonstration, Louis Philippe withdrew his orders, and spent the 23d in vain negotiations. On Feb. 24, alone of Louis Philippe's council, Bugeaud still urged war to the knife; but the king considered the sacrifice of the marshal as a means to make his own peace with the national guard, and Bugeaud was dismissed. Two days later he offered his services to the provisional government, but they were not accepted. When Louis Napoleon became president he conferred the command in chief of the army of the Alps upon Bugeaud, who was also elected by the department of Charente-Inférieure as representative in the national assembly. He is the author of several military publications, and is represented by his disciple Gen. Trochu (in *L'Armée française en 1867*) as a model general and citizen. In August, 1852, a monument was erected to him in Algiers, and also one in his native town.

BUGENHAGEN, Johann (popularly known as Pomeranus or Dr. Pommer), a German reformer, born at Wollin, near Stettin, June 24, 1485, died in Wittenberg, April 20, 1558. He was principal of the Treptow school from 1508 to 1520, and founded a college in the neighboring convent of Belbuck, celebrated as a starting point of the reformation in Pomerania. Being subjected to persecution on successfully preaching the new doctrines, he joined Luther in 1521 at Wittenberg, in 1522 was appointed professor of theology, and in 1523 pastor of the principal church, where he officiated in 1525 at Luther's wedding. He became the principal coadjutor of Luther and Melancthon; was one of the original authors of the Augsburg confession; aided Luther in the translation of the Bible; and published a Low-German version of it himself. He also prepared able commentaries on the Psalms, and was the first to propose the act of confirmation. But he chiefly distinguished himself by organizing Protestant churches and schools in Saxony, and in many other parts of Germany (1528-'84), and in Denmark and Norway (1537-'42). He framed the new Danish ecclesiastical law; reorganized the university of Copenhagen, of which he was for a while rector and professor; and was esteemed by the Danes as their foremost religious reformer. He returned to Wittenberg in 1542, and toward the close of his life lost his sight. His principal work is *Interpretatio in Librum Psalmorum* (Nuremberg, 1523). Among his other works are a learned history of Pomerania (Greifswald, 1528), and *Historia Christi Passi et Glorificati* (1530), which passed through many editions. Among Bugenhagen's biographers are Engel-

ken (Berlin and Stettin, 1817), Zietz (Leipzig, 1829), and Bellermann (Berlin, 1860).

BUGGE, Thomas, a Danish astronomer, born in Copenhagen, Oct. 12, 1740, died June 15, 1815. He was educated at Copenhagen, and in 1777, after having been employed for some years by the royal society of sciences in a series of geographical measurements, was appointed professor of astronomy and mathematics in the university of that city. He made a scientific journey through Germany, Holland, France, and England, at the expense of the government; greatly improved the Danish national observatory; made several important astronomical discoveries and meteorological observations; and invented some valuable instruments. Sent to Paris in 1798 to confer with the French savants on a standard of weights and measures, he was admitted a member of the institute. When Copenhagen was bombarded by the English in 1807, his house caught fire, but he abandoned his valuable library and apparatus in order to save the instruments and other property of the royal observatory, of which he was custodian. For this he was appointed councillor of state and received the order of Danebrog. He left elementary treatises on astronomy and mathematics, a narrative of his mission to France in 1798, some excellent geographical maps, memoirs in the transactions of various learned bodies, &c.

BUGHIS, or *Bugis*, a people of the Malay archipelago, whose chief seat is in the S. W. peninsula of Celebes, in the territories of Boni and Waju. The Bughis traders are the chief carriers and factors of the Indian seas, and are engaged in the tripang, pearl, and other fisheries. Barbosa, in 1515, describes the Bughis and their neighbors, the Macassars, as ferocious pirates and cannibals. The Macassars afterward overpowered the Bughis, and forced them to embrace Mohammedanism. Wallace, in 1857, describes them as peaceable, orderly, and well-behaved. They have domesticated the horse, ox, buffalo, and sheep; cultivate cotton, and manufacture it into cloths; are skillful workers in iron and copper, and build substantial houses and durable sailing vessels; use charts and the compass, have framed a calendar, dividing the solar year as we do, and have reduced their language to a written form with an alphabet different from that of their neighbors. Their government is an oligarchy or elective monarchy. The state of Boni is composed of 7 principalities, and that of Waju of 40. In both states the sovereign is elected by the nobles, and from the patrician class, female being eligible, and usually preferred; the vote in choosing a ruler must be unanimous; the sovereign only holds power during good behavior, and may be deposed by an adverse majority vote in council. The people pay no taxes, except a small tribute of three days' labor, or an equivalent, to the sovereign; and there are no imposts on trade. The princes derive their revenue from their own estates.

The Tuwaju or Waju tribes are esteemed as decidedly superior in many respects to their brethren of Boni. Large communities of these people have within the present century been formed in Borneo, in Sumatra, in portions of Celebes distant from the parent country, and in many small islands of the archipelago. The native entrepot of Bonirati is one of their settlements. In Singapore they form a separate and flourishing community. They have not been encouraged by the Dutch to establish settlements in their possessions.

BUHLE, Johann Gottlieb, a German philosopher, born in Brunswick in 1763, died in 1821. When only 18 years old he delivered a course of lectures on the history and literature of philosophy; and at the age of 20 he gained at Göttingen the academical prize. In 1787 he was appointed extraordinary and in 1792 ordinary professor of philosophy at Göttingen. When the French occupied Hanover he was deprived of his professorship, and withdrew to Russia, where he became successively professor of philosophy, history, and literature in the university of Moscow, librarian of the grand duchess Catharine, and councillor of state. He retired from Moscow before its occupation by Napoleon, and drew up a comparison between the taking of Moscow by the French and of Rome by the Gauls. He returned in 1814 to his native town. He published *Lehrbuch der Geschichte der Philosophie* (1798-1804); *Lehrbuch des Naturrechts* (1799); *Geschichte der neuern Philosophie* (1800); *Ursprung und Schicksale der Rosenkreuzer und Freimaurer* (1804); *Versuch einer kritischen Literatur der russischen Geschichte* (1810); and other works.

BUHL WORK, a process of inlaying by the use of the saw, the name of which is derived from a French workman named Boule, who invented and carried it on during the earlier part of the reign of Louis XIV. With him it consisted in inlaying dark-colored tortoise shell or wood with brass, cut in flowing patterns to imitate vines and wreaths of flowers. Reisner, who practised the art at a little later period, made use of woods which contrasted well in color; and the term is now applied to his process. The general term *marqueterie* designates in France all the varieties of this kind of work. It consists in cutting out a pattern from two veneers of different-colored woods, which are glued together with a piece of paper laid between them; and then, after separating the pieces by running a thin knife blade through the paper, the patterns are carefully taken out, and the figure removed from the one is inserted into the cavity of the other, the dust of the wood being rubbed in to fill the interstices. The cutting of the pattern is effected by the use of a very fine saw, of the kind known as a key saw, which can readily be made to run around the sinuosities of the pattern. The suitable designs for this work are continuous figures, like a running vine or the honeysuckle,

the saw completing these without the necessity of discontinuing the work to commence anew. When three thicknesses of wood are glued together and cut, the work is carried on more rapidly, and with more variety; but it is not found expedient to increase the number of thicknesses beyond this. In old work of this kind it has been found that different woods contract unequally, and at last produce a defective joint. This is remedied by the use of veneers of the same light-colored wood, one of which is dyed a dark color. In inlaying pearl work by the buhl method, some modifications of the process are rendered necessary by the small size of the pieces, and by greater care required to make a nice joint. The saw in this is run through at an angle to give a bevelled edge, and the lines are filled in with threads of white metal, as tin or pewter.

BUHRSTONE, the best material known for constructing millstones. It is a silicious rock found interstratified with the sands, marls, and sandstones of the tertiary formations of the Paris basin, peculiar for its regular cellular structure and hardness like flint, with which it is identical in composition, both being mere varieties of quartz. It is these qualities of extreme roughness, derived from its honeycombed structure, and great hardness and strength, that render it the best stone for grinding. The fossil shells of land and fresh-water origin, with which the rock is sometimes filled, are converted into the same hard silicious substance as the rest of the stone, and their cavities are often lined with crystals of quartz. The color of the rock is whitish, with a shade sometimes of gray, and sometimes of yellow and blue. The best quality is that about equally made up of solid siliceous and of vacant spaces. The stones are quarried at numerous localities near Paris, whence they are transported in large quantities into the interior, and to Bordeaux and Havre for exportation. La Ferté-sous-Jouarre, in Seine-et-Marne, is one of the most important points where they are procured. The quarries are worked open to the day, and the stones, when extracted from their beds, are split with wedges into cylindrical forms. The pieces are cut into parallelipeds, which are called *panes*. These are to be hooped together into the shape of millstones, answering the purpose perfectly well, while they are of much more convenient size for transportation than single stones. Good millstones of a bluish white color, and $6\frac{1}{2}$ feet diameter, are worth 1,200 francs, or about \$250, each. In this country numerous substitutes for the French buhrstone have been found, the most important of which is furnished by the buhrstone rock of the bituminous coal measures of northwestern Pennsylvania and eastern Ohio, immediately underlying the principal iron ore deposits of that region. This rock has been wrought into millstones ever since the revolution, but the French rock has maintained a decided preference in all the great markets.

BUIL, Bernardo, a Spanish Benedictine, the first missionary to the new world, born in Catalonia, died in 1520 as abbot of the convent of Cuxa. In 1498 he was appointed by the pope his vicar apostolic in the new world, and accompanied Columbus to Hispaniola on his second voyage, taking with him several priests. He differed with Columbus concerning the treatment of the natives, and in 1495 returned to Spain, where he bore a prominent part in the charges which led to the ruin of Columbus.

BUKOWINA, a crownland of Cisleithan Austria, bounded N. and N. W. by Galicia, E. by Russia and Moldavia, S. by Moldavia, and W. by Transylvania and Hungary; area, 4,086 sq. m.; pop. in 1869, 513,404, of whom 40 per cent. are Ruthenians, 39 Roumans, 9 Jews, and 7 Germans, the remainder Poles, Magyars, Armenians, and Czechs. The dominant church is the Oriental Greek, which has a bishop at Czernowitz, and to which 74 per cent. of the population belong. The chief occupation is agriculture and forestry, in which more than three fourths of the population are engaged. Bukowina embraces the continuation of the Carpathian mountains and their transition into the hilly ranges which extend from the upper Pruth and Sereth to Moldavia. The river Dniester only touches the northern frontier; the Pruth traverses the country, and its affluent the Czeremosz forms the N. W. frontier. The Sereth and its affluents the Suczawa and Moldava rise in western Bukowina, and flow southward into Moldavia. Forests, chiefly beech, nearly cover the eastern half of the country, and it is from them that the name Bukowina (Polish, beech-land) is derived. The chief products are maize, oats, rye, wheat, and potatoes. The mines are of comparatively little importance, being confined to the S. E. corner. Some iron and copper are produced, and in 1871 there were three glass works, a few paper mills, and 120 distilleries. In point of education Bukowina belongs among the least favored crown lands of the monarchy; 80 per cent. of the children of school age remain without instruction, and of the recruits for the army only 8 per cent. are able to write. There are gymnasia at Czernowitz and Suczawa, and a sub-gymnasium (*Untergymnasium*) at Radautz. In Czernowitz there is a theological institution of the Oriental Greek church. The diet is composed of the governor or *Landeshauptmann*, the Oriental Greek bishop, 9 delegates of the large real estates, 2 of the capital, 2 of the chamber of commerce and industry at Czernowitz, 8 of the towns and industrial places, and 12 of the rural communities. For administrative purposes the country is divided into the capital and 8 districts or *Hauptmannschaften*. Besides the capital, Czernowitz, there were in 1871 five towns having upward of 5,000 inhabitants.—Toward the close of the middle ages Bukowina formed a district of Moldavia. Its possession was often disputed by the Poles. With Moldavia it became tributary to the

Porte. It was conquered by the Russians in 1769, restored soon after, and in 1777 ceded to Austria, which united it with Galicia. In 1849 it was erected into a separate crown land.

BULAMA, the easternmost of the Bissagos islands, off the W. coast of Africa, 20 m. S. of Bissao; lat. 11° 34' N., lon. 15° 33' W. It is about 18 m. long by 9 m. wide, densely wooded and fertile, but unhealthy. The land rises from the coast toward the centre, where the elevation is about 100 ft. above the sea. It has a good harbor. In 1792 an English company, called the Bulama association, sent out here a colony of 275 adventurers, most of whom were soon carried off by disease. (See BEAVER, PHILIP.)

BULAU, or *Tikus* (*Gymnura Raflesii*, V. and Horsf.), an insectivorous mammal of the *talpidae* or mole family, inhabiting Sumatra and Malacca. In general shape it resembles the American opossum; the muzzle is much elongated, overhanging the lower jaw, and truncated at the end; eyes and ears small, the



Bulau (*Gymnura Raflesii*).

latter bare and rounded. The teeth are 11 on each side in each jaw, adapted for crushing insects; the feet are 5-toed, the 3 central toes the longest; on the anterior part of the body the fur is rendered harsh by long bristly hairs; the tail is nearly naked, scaly, and rat-like. The body is 12 to 14 inches long, and the tail 10 inches; the height at the shoulder about 5 inches. The color is a mixture of black and white, the latter prevailing on the head, neck, sides, and lower portion of the tail; there is a black stripe over each eye. It secretes a substance having a strong musky odor, which led Sir Stamford Raffles, its discoverer, to place it among the civets (*cierra*).

BULGARIA, a province of European Turkey, bounded N. by the Danube, which separates it from Roumania, E. by the Black sea, S. by the Balkan chain, which separates it from Roumelia, S. W. by Prisrend, and N. W. by Servia; area, about 89,000 sq. m.; pop. estimated at about 2,500,000, of whom about 40 per cent. are Bulgarians and 20 per cent. Ottomans, the remainder being Jews, Serbs, Greeks, Armenians, Tartars, Circassians, Albanians.

losniaks, Wallachs, and gypsies, with a few settlers from various European countries. The Bulgarians, with the exception of about 170,000 Mohammedans and 6,000 Roman Catholics, belong to the Greek communion, of which here are 10 archbishoprics and 3 bishoprics. Until 1864 Bulgaria was divided into the three *yalets* or *pashalics* of Silistria, Widin, and Nissa. It is now officially known as the *vilayet* of Tuna, or principality of the Danube. It is divided into seven *sanjaks*, or districts, under a governor general, whose residence is at Rustchuk. Sophia, Nissa, Trnova, Sistova, and Nicopolis are among the chief cities. The principal fortified towns are Silistria, Rustchuk, and Widin on the Danube, Varna on the Black sea, and Shumla in the interior, commanding the main pass through the Balkan mountains. Bulgaria presents the appearance of a plateau,



Bulgarian Costumes.

which rises gradually from the steep banks of the Danube to the heights of the Balkan. Numerous branches of the chain run N., dividing the country into valleys whose streams flow into the Danube; the principal of these are the eastern branch of the Morava, which enters Servia, the Isker, Vid, Yantra, and Taban; the Kamtchik and Pravadi enter the Black sea, and the Struma flows S. into Macedonia. Nearly the whole south is traversed by branches of the Balkan (see BALKAN), which near the S. W. corner connects with the Despot Dag, the connecting links being the Rilo Dag and the Vitosh range. The latter, which has been identified with the Scymus of the old geographers, is an enormous syenite mass rising in the form of a volcanic cone to a height of about 6,600 ft. above the sea. This part of the country, between Ikhtiman and Radomir, consists of mountain ranges and extensive val-

ley basins from 1,700 to 3,000 ft. above the sea. They are all enclosed by primitive rock, and filled with pebbles, sand, and clay, partly of diluvial and partly of recent date. The southern mountains are thickly wooded, and the northern and eastern portions are cultivated plains bearing grain. There are numerous warm mineral springs, especially near Sophia. The coast of Bulgaria, from Cape Emineh, the most eastern extremity of the Balkan, to Cape Kali-Akra, N. E. of Varna, is generally high; N. of this point the shore is flat and marshy. Between the town of Baba-Dagh, in the north-eastern lowland known as the Dobrudja, and the sea is the lake of Rassein or Rasin, 30 m. long by 10 wide. It is separated by a narrow strip of land from the St. George's arm of the Danube, from which a small stream enters the lake; the communication of the lake with the Black sea being formed by two channels.—The Bulgarians, of whom nearly as many live in the adjoining parts of Turkey as in the province named after them, are a peaceable, industrious, and rather intelligent people, though generally ignorant and superstitious. Their *papasés* (priests) are hardly more enlightened than their flock. Witches are often resorted to for spells to cure diseases, bring rain, &c., by both the people and *papasés*. Each village has its *medjlis* (court), consisting of a mayor and several members, before whom minor civil suits and offences are settled. The dress of a Bulgarian consists of a sheepskin cap dyed brown or black, a short open jacket, a broad girdle which answers the purpose of pockets, drawers buckled at the knee, and folds of flannel wrapped round the legs. The women wear a bodice, a cloth jacket, a skirt which does not reach the ankle, and on the head a small stiff red cap with gold or silver coins sewn upon it. The houses are built of wood, and sometimes of earth and pebbles. The roads, with the exception of some highways lately constructed, are bad, and on the plains they are quite impracticable during the rainy season. The mountains are often infested by robbers called *Balkan tchelebis* or Balkan gentlemen, and *kheris* or common highway robbers and murderers. The former consist mainly of Moslems who through oppression of the government have betaken themselves to the forest. The Bulgarians occupy themselves chiefly with agriculture and rearing cattle; and the country easily supplies all their wants. Large quantities of grain are raised for the Constantinople market. The vine is also extensively cultivated and produces excellent wine. Horned cattle and horses are reared in the mountains and uncultivated parts of the plains, and exported to different parts of Turkey and Austria. In the mountains honey, pitch, and game are obtained. Timber is floated down the rivers to the ports of the Danube. Silver and gold are found in small quantities in the beds of the streams. In the mountains around Samakov

and the Vitosh magnetic iron exists in the form of small grains in the syenite. These are washed down by the winter torrents, and the iron, being reduced to powder, is left in the beds of the streama. Artificial basins are made into which the water is conducted by aqueducts, and the deposited iron is then collected. In the neighborhood of Samakov there are about 80 founderies in operation; and there are other founderies on the Isker. Charcoal and hazel wood are used for smelting. Coal is found in the mountains, and in some places appears on the surface; but no mines are worked. Manufactures are still in their infancy, the chief articles produced being coarse woollen and linen stuffs, embroidery, and rifle barrels; attar of roses is prepared in considerable quantities, and much of it exported to England. The agricultural products annually amount to 325,000,000 piastres, the industrial products to 80,000,000. The taxes and imposts collected by Turkey annually amount to 70,000,000 piastres. There are large tracts of uncultivated land belonging to the government, which may be occupied by any one on condition of paying one tenth of the produce as a tribute. There is a railway, the first constructed in the empire, 40 m. long, between Kustendji on the Black sea and Tchernavoda on the Danube. Another railway has been opened from Varna to Rustchuk, with a branch to Shumla. The Bulgarians, who now form the principal division of the Slavs in Turkey, appear first in history not as a Slavic but as a Finnic tribe, then living on the western banks of the Volga. The more warlike part of this tribe, leaving that river, first settled on the Don, then went toward the Danube in the latter part of the 5th century. Here they continually harassed the Byzantine empire, and about 500 repeatedly pitched their camp before the walls of Constantinople. The emperor Anastasius bribed them to depart, and in order to protect the capital against future inroads he built a long wall in 507. They reappeared in the reign of Justinian, but Belisarius dispersed them. The Avars subdued the Bulgarians, who, however, soon regained their independence. Their khan, Kuvrat, made an alliance with Heraclius, who created him a patrician. On the death of Kuvrat his five sons separated; one established himself on the banks of the Don, another in Pannonia, a third in Moldavia, a fourth went to Italy, and the fifth, Asparukh, crossed the Danube and about 680 settled in the country between that river and Mt. Hæmus (Balkan), then known by the Roman name of Mæsia Inferior, ultimately changed into Bulgaria. Some historians reckon this separation as taking place at an earlier period, and from Sarmatia. Justinian II. attempted to destroy the Bulgarian khanate, but was compelled to acknowledge the independence of the successor of Asparukh. When Justinian was driven from Constantinople, the Bulgarians reinstated him on the throne. About 750 Kormes, one of the successors of Asparukh,

invaded Thrace, but was slain by his own soldiers, and the sovereignty, which had hitherto been hereditary in the family of Kuvrat, became elective. Constantine Copronymus invaded and ravaged Bulgaria, but without reducing it to subjection. Khan Krum, after massacring the greater part of the Greek army and killing the emperor Nicephorus in 811, fought the emperor Michael at Adrianople in 813 and advanced as far as Constantinople. About 860, during the reign of Bogoris, who assumed the title of king, Christianity was introduced into Bulgaria. By constant intermixture with the surrounding Slavs, during their migrations as well as in Mæsia, the Bulgarians had gradually lost their national Finnic characteristics, and about the time appear as a Slavic nation, speaking a richly developed Slavic dialect. Their struggle with the Byzantines continued. After a long series of successes and reverses, in which the most atrocious cruelties were perpetrated on both sides, the Bulgarians about 1018 submitted to the emperor Basil II. Bulgaria was thenceforth governed by dukes, and the emperor insured the peace of the country, transported a number of Bulgarians into Asia, and replaced them by Petchenegs. Peter and his brother Assan, descendants of the ancient Bulgarian khans, raised a revolt in 1186, and proclaimed themselves kings. Here commenced the dynasty of the Assanides, who were constantly engaged in war with the Greeks, Hungarians, and Tartars, till 1389. At this period the Turkish armies under Amurath I. invaded Bulgaria, and vanquished the Bulgarians and Servians at the battle of Kosovo. Since that date Bulgaria has been subject to the Turks, and the Bulgarians have borne the Turkish yoke with more resolute endurance than any other Christian population, the province, with its many fortresses, forming a principal stronghold of the Porte. In 1828-'9 Bulgaria was the theatre of the Russian war. After its close a large number of Bulgarians emigrated to Bessarabia. In 1841 the exactions of the pashas occasioned a rising in Bulgaria. During the Crimean war the Russians crossed the Danube and besieged Silistria, but were compelled to retreat. In 1856 the Bulgarians sent a petition to the sultan, demanding the right of electing among themselves the chief dignitary of their church and of choosing their own governor; an entire separation between Turks and Bulgarians; to have their own authorities and judges; to differences between Turks and Bulgarians to be settled by mixed tribunals; the right of having every crime judged in the place of commission; and that the regiments recruited in Bulgaria should have Bulgarian officers, and use the Bulgarian language. The Porte accorded none of these claims. In 1859 the question was again agitated, the Bulgarians refusing to pay their dues to the Greek patriarch of Constantinople and driving away their bishops. These efforts were seconded by Russia. Two parties were formed, one declaring for a church inde-

pendent of Constantinople and Rome, and the other, supported by French influences, proposing a union with Rome. In March, 1861, a conclave was held by the Greek patriarchs of Constantinople, Alexandria, Jerusalem, and Antioch, and the bishops of the two parties were excommunicated. The party who favored a union with Rome sent an address to Pius IX. to that effect, and claimed to speak in the name of 400,000 Bulgarians. The pope appointed Sokolski archimandrite, who also received valuable presents and a decree of investiture from the sultan. On June 18, 1861, Sokolski suddenly disappeared with the decree. It was said that he had retired to a convent in Kiev, and afterward that he was dead. According to other (Roman Catholic) accounts, he was carried off by Russian emissaries. In 1872 the number of Catholic Bulgarians was estimated at only 4,000, with only one bishop, who had the title of apostolic administrator. In June, 1862, Prince Gortchakoff addressed a note to the diplomatic corps inviting the powers to unite with Russia to intervene in favor of the Christian subjects of Turkey. The Porte averted complications by making a temporary reform in Bulgaria. In the same year a considerable immigration of Tartars from the Crimea and the Kuban took place. Russia invited the Bulgarians to occupy the districts deserted by the emigrants. In 1865, in pursuance of the policy of decentralization, Bulgaria was erected into a vilayet or principality; and in 1870 the religious demands of the Bulgarians were finally granted in a firman which provided for a separate administration, to be called the exarchate of the Bulgarians. The exarchate was not, however, actually established until February, 1872, when the Bulgarian church council elected the metropolitan Anthimos of Widdin first exarch. In October, 1872, the entire exarchate was excommunicated by a general Greek synod at Constantinople.

BULGARIAN LANGUAGE AND LITERATURE.

Bulgaria and the adjacent provinces of Macedonia are considered to have been the cradle of the old Slavic languages. The ancient Bulgarian language was the richest of them all, and was the Scriptural language of the Greek-Slavic church, and the great medium of ecclesiastical literature in the ancient Slavic lands. After the overthrow of the Bulgarian kingdom at the close of the 14th century, the grammatical structure and purity of the language became impaired by admixture with the Wallachian, Albanian, Rouman, Turco-Tartar, and Greek vernaculars. Turkish inflections are appended to Slavic words; but properly the modern Bulgarian language has only the nominative and the vocative of the seven Slavic cases, all the rest being supplied by prepositions; the inflection of the verb is in like manner imperfect. There is an article, which is put after the word it qualifies, like that of the Albanians and Wallachians. Among the ancient Bulgarian literature must be mentioned the

translations of the Bible by Cyril and Methodius, and the writings of John of Bulgaria in the 10th century. The separation of the Bulgarian church from the Latin, and its union with the Greek, had no influence in creating a Bulgarian literature; the clergy, then as now, procured their liturgies from Russia. The modern literature is very slender, consisting almost entirely of a few elementary and religious books. Grammars of the Bulgarian language were published by Neofyt in 1885, and by Christaki in the following year. Venelin, a young Russian scholar sent to Bulgaria by the Russian archæographical commission, published in 1837 a grammar and two volumes of a history of the Bulgarians, but died while he was engaged in preparing a third volume. A new grammar was published by Bogoyev in 1845, and finally in 1849, by the Rev. E. Riggs, an American missionary stationed at Smyrna, who also sent a Bulgarian translation of Gallaudet's "Child's Book on the Soul" to New York. Dictionaries of the Bulgarian language have been prepared by Neofyt and Stojanowicz. A Bulgarian version of the New Testament was printed at Smyrna in 1840 for the British and foreign Bible society. The Bulgarian national songs are numerous, and are similar to those of the Servians. Celakovsky's collection of Slavic songs contains a number of Bulgarian songs. Bogoyev published twelve historical poems in 1845. There is as yet no place in Bulgaria where books are published. Works in the language are printed in Bucharest, Belgrade, Buda, Cracow, Constantinople, Smyrna, and Odessa.

BULGARIN, Thaddæus (Polish, **TADEUSZ BULGARIN**), a Russian author, born in Lithuania in 1789, died at Dorpat, Sept. 13, 1859. His father fought under Kosciuszko in the Polish war of independence, after the close of which his mother removed to St. Petersburg, where Thaddæus was educated at the military academy. In 1805 he took part in the war against France and Sweden, subsequently left the Russian service, fought under Napoleon, and after the emperor's downfall occupied himself with literary pursuits in Warsaw. After some time he returned to St. Petersburg and devoted himself to Russian literature. In 1823 he edited the "Northern Archives," originally a historical and statistical journal, which he made popular in Russia by his humorous and satirical contributions. In 1825 he published in conjunction with his friend Gretch the "Northern Bee." He became also editor of the first Russian theatrical almanac, called the "Russian Thalia." His complete works, published at St. Petersburg in 1827, and at Leipzig, in German, in 1828, include many of his fugitive essays, and his Spanish sketches, to which he added his Turkish sketches in a separate volume. In 1829 he made his debut as novelist with "Ivan Vnizhigin, or the Russian Gil Blas," of which "Peter Ivanovitch Vnizhigin" is the continuation. Subsequently he published three works

containing pictures of Russian life, "Rostavleff," "Demetrius," and "Mazeppa." His "Russian Gil Blas" was published in English at Aberdeen in 1831, and his "Russia from a Historical, Statistical, Geographical, and Literary Point of View," one of his most valuable works, has been translated into German. His *Vospominaniya*, or "Recollections" (6 vols., St. Petersburg, 1844-'9; German translation, 1859-'60), contains interesting reminiscences of his stirring life.

BULIMUS, a genus of land snails of the family *helicida*, largest and most numerous in the humid regions of northern Brazil. The shell is oblong or turreted, with the longitudinal mar-



Bulimus rosaceus.

gins unequal, with or without a tooth. The *B. rosaceus* is generally found in the dry season adhering to the under surface of stones near the seashore, or to the leaves of a plant resembling the aloe, for which it has an unexplained preference. In the wet season it burrows near the roots of this plant, and deposits its eggs about two inches below the surface of the ground. During the whole dry season it appears to be in a dormant state. The *B. ovatus* attains a length of six inches, and is exposed for sale in the markets of Rio de Janeiro; like other tropical species, it cements dead leaves together to conceal and protect its large, brittle, and bird-like eggs, which are an inch long. At least 30 fossil species are found in the eocene. The species of temperate regions are of small size.

BULLEY, Peter, an American clergyman, born at Woodhill, Bedfordshire, Eng., in 1588, died at Concord, Mass., March 9, 1659. He was educated at Cambridge, and succeeded to the living of his father in Woodhill, which he retained for 21 years. He was removed from this by Archbishop Laud for nonconformity, wherefore he left England for the new world in 1635, and with a few companions founded the settlement of Concord. He was the author of some Latin poems, which are contained in Cotton Mather's "History of New England," and of the "Gospel Covenant Opened" (London, 1646).

BULL. See Ox.

BULL, Papal (L. Lat. *bulia*, a seal), one of the forms in which the pope issues his ordinances. It differs from a brief in that the latter, though of equal authority, is issued with less solemnity. Briefs are sealed with red wax, stamped with the ring of the fisherman. The seal of a bull is of lead or gold, stamped on one side with the effigies of Saints Peter and Paul, and on the

other with the name of the reigning pope, and attached to the document by strings. The two acts differ also by the subscription, salutation, and apostolic benediction, which are simpler in the brief; and by the date, which is taken from the modern calendar for briefs, and from the Roman calendar for bulls. Bulls are commonly designated from the words with which they commence, as the bull *In cœna Domini*, which was formerly read publicly at Rome on Holy Thursday, and contains a general excommunication against heretics and those contumacious and disobedient to the holy see. Its publication was suspended by Clement XIV. in 1778. Among the bulls most celebrated in history are the *Clericis laicos*, given in 1296 by Boniface VIII., and which began his contest with Philip the Fair; the *Execrabilis*, issued by Pius II. in 1460, to interdict appeals to future councils; the *Exsurge Domine*, directed in 1520 by Leo X. against Luther, who burned it at Wittenberg; the *Cum occasione*, by which Innocent X. condemned the five propositions of Jansenius, in 1653; the *Unigenitus*, issued by Clement XI. in 1713, against the "Moral Reflections" of Quesnel; the *Post diurnas*, by which Pius VII. in 1800 established a new judiciary order in the states of the church; the *Ineffabilis Deus*, by which Pius IX. in 1854 defined the dogma of the immaculate conception; and the *Æterni Patris*, June 29, 1868, by which he convoked the œcumenical council of 1869-'70, which defined and affirmed the doctrine of papal infallibility.—*Bulla dimidia*, or half bulls, are bulls issued by the pope before his coronation, and so called from the fact that the lead or gold is stamped only on one side.

BULL, George, an English prelate, born at Wells, Somersetshire, March 25, 1634, died Feb. 17, 1710. He was educated at Oxford, ordained at the age of 21, and became rector of St. George's, near Bristol. In 1658 he became rector of Suddington St. Mary, in Gloucester, and in 1662 of Suddington St. Peter. In 1669 he published in Latin *Harmonia Apostolica*, an attempt to reconcile the apparent contradictions between St. James and St. Paul on the doctrine of justification. This publication extended his fame to foreign countries, and his reputation procured him a stall in the cathedral of Gloucester. In 1705 he was promoted to the bishopric of St. David's.

BULL, John, the familiar name given to the English, not only by others but by themselves. It is generally used in a humorous sense, and is not always considered disparaging. The English seem to regard it as significant of sturdiness, though sometimes it is used to convey the idea of stupidity, obstinacy, and unreasonable rage. It is said to have been first used by Dean Swift, but its first considerable application in literature was made by Dr. Arbuthnot in his allegorical satire, "The History of John Bull," published in 1712.

BULL, John, an English musician, born in Somersetshire about 1568, died in Lübeck, Ger-

many, about 1622. In 1596, on the recommendation of the queen, he was appointed professor of music at Gresham college, which post he resigned in 1607 to become chamber musician to King James. He quitted England in 1613, and finally settled in Lübeck. He was considered the best organist of his age. Having once performed before King James a song which he called "God save the King," the present national anthem of England has been erroneously attributed to him.

BULL, Ole Bornemann, a Norwegian violinist, born at Bergen, Feb. 5, 1810. His father, a chemist, who had destined him for the church, steadily repressed his passion for music. At the age of 18 he was placed at the university of Christiania; but when he took the temporary charge of the orchestra at one of the theatres, during the illness of the leader, his connection with the university was dissolved. In 1829 he went to Cassel to study with Spohr, but his reception was so chilling that in despair he went to Göttingen and commenced the study of the law. His fondness for his art soon interrupted this pursuit, and he went to Minden, where he fought a duel in which his antagonist was mortally wounded. He then went to Paris, where he was reduced to great straits, and attempted to drown himself, but was rescued. A lady who saw in him a likeness to her deceased son took him into her house, and enabled him to make his appearance as a violinist. The proceeds of his first concert gave him the means for a musical tour through Italy. The next seven years were spent in professional journeys through Italy, France, Germany, England, and Russia, by which he acquired a handsome fortune. Returning to his native place in 1838 with his wife, a Parisian woman, he settled upon an estate which he had purchased in the neighborhood. At the end of five years he came to the United States, and after a career of great success returned to Europe in 1845. During the next seven years he gave concerts in the chief cities of the continent, made a campaign in Algeria against the Kabyles with Gen. Yusuf, made improvements in musical instruments, built a theatre in Bergen, and endeavored to establish in Norway national schools of literature and art. He introduced political sentiments into the dramas performed at his theatre, and was brought into collision with the police. Lawsuits in 1852 dissipated a large portion of his fortune, and he once more left his country for the new world, and purchased a large tract of uncultivated land, comprising 120,000 acres, in Potter co., Penn. A large number of families, to whom the lands were sold at a nominal price, gathered upon the spot, forming the germ of a colony, to which the name Oleana was given; but at length the project was abandoned and the colony broken up. Ole Bull resumed his concerts, and in 1854 took a lease of the academy of music in New York, with the intention of undertaking the management of the Italian opera; but the enterprise

proved disastrous. He then returned to Europe, and in 1869 revisited the United States, where he has since chiefly resided, and where in 1870 he made a second marriage.

BULLDOG (*canis molossus*), a variety of dog, of the division *ferox*, said to be peculiar to the British islands, and distinguished for its ferocity. The bulldog is low in stature, deep-chested, and strongly made about the shoulders, which, with the chest and neck, are enormously developed, as are also the muscles of the thighs behind, although generally the hind quarters are light as compared to the fore part, and the flanks hollow and tucked up, like those of the greyhound. He is remarkable for a short broad muzzle, and the projection of his lower jaw, which causes the lower front teeth to protrude beyond those of the upper. The condyles of the jaw are placed above the line of the upper grinding teeth; and it is this conformation which renders the bite of the bulldog so severe, and his hold when once taken almost immovable. The lips are thick, deep, and pendulous; the ears fine, small, and pen-



Bulldog (*Canis molossus*).

dent at the tip; the tail thick at the root, but tapering to a point as fine as that of the greyhound. "He is the most ferocious and unrelenting of the canine tribe, and may be considered courageous beyond every other creature in the world; for he will attack any animal, whatever be its magnitude, without hesitation, either at his own caprice or at the bidding of his owner. His most important quality, and that probably which causes all the others, is the diminution of the brain, which in the bulldog is smaller and less developed than in any other of the race; and it is doubtless to the decrease of the encephalon that must be attributed his want of intelligence, and incapacity for receiving education." So strongly marked is this peculiarity, that a recent writer considers the bulldog as a sort of abnormal canine monster, a dog idiot, yielding to uncontrollable physical impulses, now of blind ferocity, now of equally blind and indiscriminating tenderness. A thorough-bred bullpup of six months, the first time he beholds a bull, will run at the

head, and, seizing him by the lip, tongue, or eye, hang on, in spite of every attempt to detach him, and will suffer himself to be killed or even dismembered rather than forego his hold. It was an old saying that one bulldog was a match for a bull, two for a wolf, three for a bear, and four for a lion. With the decline of bull-baiting the demand for the bulldog has ceased; although he is still found useful to cross with other dogs, to which he imparts courage, endurance, and tenacity of purpose. There is a large cross of the bulldog in the greyhound, introduced by Lord Orford, to give certain valuable qualities; and the greyhound shows it by his always running at the head of large animals, as the deer. There is also a probable cross in the pointer, shown in the pendulous jowl and rat tail, as well as in the determined character.

BULL FIGHT, a Spanish amusement, originally introduced by the Moors, and adopted in all the cities of the kingdom, each of which has an arena of greater or less magnificence, called the *plaza de toros*, set apart for this entertainment. The bulls are turned out, one by one, into the open space, where they are first assailed by horsemen, called *picadores*, who attack them with the lance. The horses are often ripped up, but the moment the *picador* is overthrown a crowd of active footmen, called *chulos*, provided with crimson banners, take off the attention of the bull while the horseman makes his escape. The bulls are next tormented by the *banderilleros*, armed with sharp-barbed darts having fireworks and flags attached to them, until they are thickly covered with shafts, bleeding and scorched by the explosions of the fireworks. Then the principal performer, the *matador*, enters the arena, habited in black, and armed only with a long straight sword, with which he soon gives the *coup de grace* to the tortured brute, thrusting the blade up to the hilt into his body just at the junction of the neck and spine.

BULLFINCH (*pyrrhula rubicilla*, Pall.), a bird of the finch family, a native of northern and temperate Europe. The bill is remarkably short and thick, of a black color, and convex in all its outlines; the head is large, the neck short, and the body stout. The length of the male bird is 6 inches, the extent of wings 10 inches, the bill about one third of an inch. The plumage is soft; around the base of the bill the feathers are bristly, concealing the nostrils; the third quill of the wing is the longest; the tail nearly straight, consisting of 12 broad rounded feathers. The eyes are dark brown, the feet dusky, the claws brownish black. The upper part of the head and a band at the base of the lower jaw are glossy bluish black; the hind neck, back, and scapulars ashy gray; the rump and lower tail coverts white; the upper coverts and tail bluish black; the quills and primary coverts are brownish black, the outer webs of the secondaries being glossed with blue; the secondary coverts are tipped with

gray or grayish white, forming a bar on the wing; the cheeks, front of the neck, breast and sides are light crimson; the belly grayish.

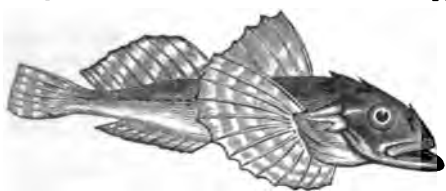


Bullfinch (*Pyrrhula rubicilla*).

white. This is the ordinary male plumage, which in captivity becomes sometimes very dusky. The female is a little smaller; the coloring is similar, but the tints are much duller: the parts which are red in the male are dull grayish brown in the female. The bullfinch is fond of wooded and cultivated districts, avoiding barren tracts near the sea and bleak islands; it is gregarious, but seldom associates with other birds; it is not migratory, but frequents the woods and thickets of England during the whole year. Its flight is quick and undulating; its notes are soft, low, plaintive, and mellow. It is often caged for its beauty, and in captivity becomes very docile, and may be taught a variety of tunes. During the greater part of the year it lives in the thickets and woods, occasionally visiting the fields in search of seeds. In the spring it is very destructive to the buds of the gooseberry, cherry, plum, and other fruit trees. It begins to build its nest in the beginning of May, of small, dry twigs and fibrous roots, generally in a thorn bush, thick hedge, or bushy spruce; the eggs, four or five in number, are of bluish or purplish white color, speckled and streaked with purple and reddish brown. The young at first resemble the female, but without the black on the head; the male does not acquire the full red tint until the second year.

BULLHEAD, the popular name of several species of cottoid fishes, principally of the genera *cottus* and *acanthocottus*, inhabiting both fresh and salt water. All were formerly confounded in the genus *cottus*, but Mr. C. Girard ("Smithsonian Contributions to Knowledge," vol. iii.) has separated them, restricting the genus *cottus* to the fresh-water species, while he gave the name *acanthocottus* to the marine species, more commonly called sculpins. These two groups are easily distinguished: the head of

the former is smooth or nearly so, that of the other is tuberculous or armed with spines; the former is not found in salt water, nor the latter in fresh, though it is sometimes found in the brackish water of the mouths of the rivers. (See the work above alluded to, and the "Proceedings of the Boston Society of Natural History," vol. iii., p. 188.) The most obvious characters are the following: In *acanthocottus* the opercular apparatus is armed with strong spines; the surface of the head, and often the circumference of the orbits, is similarly armed, or is serrated in various ways; the nasal bones are in some species surmounted by a ridge or spine; the head is high and broad, occasionally deformed, with very large eyes and an immense mouth; the body is without scales, the back often arched, and the first dorsal almost as high as the second; the soft rays are three or four in the ventral fins; the lateral line runs uninterrupted and distinct from the head to the base of the tail; in the cottoids, the lateral line is remarkably developed, being in some a regular cartilaginous tube with a series of openings communicating by pores of the skin with the surrounding water, leaving no doubt that this line in fishes is intended to supply water to the system. The common bullhead or sculpin (*A. Virginianus*, Willoughby) is well known to every boy as a scarecrow among fishes. The body is of a light or greenish brown above, with irregular blotches arranged as four transverse dark brown bars; the abdomen is white, occasionally stained with fuliginous; the dorsals are crossed by dark brown bands, the pectorals light yellow with concentric brown bands, and the ventrals, anal, and caudal yellowish white, also banded. The length is from 10 to 18 inches, of which the head is about one third. There are 10 naked spines on each side, on and about the head, the largest being at the posterior angle of the preoperculum, and partially covered with a loose membranous sheath; there are also strong scapular and humeral spines, so that it is rather a difficult species to handle; the gape of the mouth is large, and the jaws, pharynx, and palate are armed with numerous sharp,



Bullhead (*Acanthocottus Virginianus*).

card-like teeth; the caudal fin is even at the end. This species is found from New Brunswick to Virginia. Another species of the New England coast is the Greenland bullhead, *A. variabilis* (Gd.), or *A. Groenlandicus* (Ouv.); these may be different species, but they are described under one head by Dr. Storer in his "Fishes of Massachusetts," in "Memoirs of the

American Academy," vol. v., p. 74. This is darker colored than the common sculpin, with large clay-colored blotches on the top of the head and gill covers, smaller ones on the back and sides, and circular yellow spots on the sides near the abdomen, which is yellow tinged



Greenland Bullhead (*Acanthocottus Groenlandicus*).

with red, and the throat dull white; the fins are more or less banded and spotted with yellow; the sides are rough from granulated tubercles. The length is about a foot, of which the head is one fourth; this is armed with spines. These ill-favored sculpins are the favorite food of the Greenlanders, though rarely if ever eaten by us. They are very troublesome in the fishing grounds of the British provinces, as they drive away all desirable fish. The bullheads are voracious, devouring small fish, crabs, echinoderms, mollusks, and almost everything, even decaying matter, that comes in the way. There are several other American species described by Mr. Girard.—The genus *cottus* (Artedi) has but one small spine at the angle of the preoperculum, and sometimes another smaller, hidden under the skin, and perceptible only to the touch, at the lower margin of the suboperculum; the head is depressed, truncated in front, and broader than high; mouth less deeply cleft than in *acanthocottus*, but, like that, having teeth on the intermaxillaries, lower maxillaries, and front of the vomer; body smooth, gradually tapering to the tail; second dorsal higher than the first; ventrals with three or four soft rays; lateral line generally interrupted. The river bullhead (*C. gracilis*, Heckel) rarely exceeds 8 inches in length, and is of a light green color, with irregular dark brown blotches, largest posteriorly; it is found in the New England states and New York. The *C. viscosus* (Hald.) is about 4 inches long, and inhabits eastern Pennsylvania and Maryland; the color is yellowish, clouded with black, the first dorsal fin being edged with a narrow line of orange; it receives its name from the sliminess of the skin; it delights in clear spring waters with pebbly bottoms, and lies concealed under stones and stumps, close to the bottom, and, when disturbed, hastens to a fresh cover; the eggs are laid in April and May, in round pack-

ets about the size of an ounce bullet, under boards and stones; it is supposed that they are watched by the parent, from her having been found under the same cover. Many other species, all small, are described by Mr. Girard as American; others are found in the colder portions of the temperate zone in Europe and Asia, at least six; it is probable that many have been confounded under *C. gobio* (Linn.).—



River Bullhead (*Cottus gobio*).

The family of cottoids appeared on the earth some time during the last period of the cretaceous epoch, the genus *cottus* appearing in the tertiary. There is a cottoid in the Columbia river, called the prickly bullhead, for which Mr. Girard has established the genus *cottopsis*, resembling the marine species in its size, but the fresh-water species in its smooth head; the body is beset with prickles, there is one preopercular spine on each side, and the teeth of the palatine bones are card-like; its length is from 9 to 10 inches; it is the *C. asper* (Gd.). The name of bullhead is also given to some species of *aspidophorus* (Lacép.) and *hemitripterus* (Cuv.), marine genera, extending from the New England coast to the Greenland seas.

BULLINGER, Heinrich, a Swiss theologian, born at Bremgarten, canton of Aargau, July 18, 1504, died in Zürich, Sept. 17, 1575. He was the son of a priest, studied at Emmerich and Cologne, became a teacher in the monastery of Kappel, and a champion of the doctrines of Luther and Zwingli. In 1528 he coöperated with the latter in effecting the conversion of the canton of Bern to Protestantism. The next year his preaching made converts of the community of Bremgarten, of which he became the first Protestant minister; but in 1531 he was expelled from the canton of Aargau and went to Zürich, where in 1532 he became pastor of the minster church. He displayed great talent, moderation, and conscientiousness in the controversies with Luther and the conflicts with the Anabaptists, and in settling the ecclesiastical differences between Bern and Geneva. His wife, formerly a nun, bore him 11 children. In 1543 he edited the works of Zwingli, and he left in manuscript *Geschichte der Eidgenossen, besonders der Tiguriner* (4 vols.) and *Reformationsgeschichte*, which latter was published by Höttinger and Vögeli (8 vols., Zürich, 1888-40).

BULLITT, a N. county of Kentucky; area 250 sq. m.; pop. in 1870, 7,781, of whom 1,194 were colored. It is watered by Sak river, and the Rolling fork of that river touches its S. W. boundary. The surface is hilly and the soil fertile. Pine woods abound, and there are numerous mines of superior iron ore. The Louisville and Nashville railroad, the Bardstown branch, and the Lebanon branch pass through the county. The Parroquet Springs (sulphur) are near Shepherdsville. The chief productions in 1870 were 34,752 bushels of wheat, 337,320 of Indian corn, 82,789 of oats, and 3,606 tons of hay. There were 2,472 horses, 1,688 milch cows, 2,117 other cattle, 4,801 sheep, and 12,570 swine. Capital, Shepherdsville.

BULLOCK, I. A S. E. county of Georgia, lying between the Ogeechee and Cannouchee rivers; area, 900 sq. m.; pop. in 1870, 5,610, of whom 1,744 were colored. The climate is healthy; the surface is generally level, and the soil poor and sandy. The pine forests, which cover a large portion, abound in game. The chief productions in 1870 were 81,556 bushels of Indian corn, 22,799 of oats, 21,034 of sweet potatoes, 1,000 bales of cotton, and 21,896 lbs. of rice. There were 993 horses, 4,533 milch cows, 9,790 other cattle, 5,677 sheep, and 15,945 swine. Capital, Statesborough.

II. A S. E. county of Alabama; area, 750 sq. m.; pop. in 1870, 24,474, of whom 17,257 were colored. It is well watered by Conecuh river and other streams. The Mobile and Girard and the Montgomery and Eufaula railroads pass through it. The chief productions in 1870 were 889,791 bushels of Indian corn, 18,632 of oats, 33,021 of sweet potatoes, and 17,973 bales of cotton. There were 1,277 horses, 2,381 mules and asses, 3,277 milch cows, 6,056 other cattle, 2,732 sheep, and 11,045 swine. Capital, Union Springs.

BULL RUN, a small stream in N. E. Virginia, which, after a S. E. course of 20 m., falls into the Occoquan, a tributary of the Potomac, about 25 m. from Washington. Upon its banks were fought two important battles of the civil war. I. July 21, 1861. In the early summer the confederates, under Gen. Beauregard, about 20,000 strong, were intrenched at Manassas Junction, 7 m. W. of Bull Run, whence they made forays within sight of the national capital. Gen. J. E. Johnston, with 18,000 men, was at Winchester, 50 m. to the N. W., where he was watched by Gen. Patterson, with about the same force. At the close of June nearly 40,000 troops had been collected near Washington. The command of this force was conferred upon Gen. McDowell, and July 8 was set down for the opening of the campaign; but the movement from Washington was not commenced till the 17th. McDowell, understanding that Patterson would take care of Johnston, moved toward Beauregard. He had 33,000 volunteers, a third of them enlisted for three months; 1,000 regular soldiers, hastily gathered from all

quarters; and 1,000 cavalry and artillery; 35,000 in all. Johnston, apprised of the federal advance, set out from Winchester to join Beauregard at Manassas, with 11,000 men, leaving the remainder of his force as a blind for Paterson. He reached Manassas on the 20th with 6,000 men, all that the railroad could transport at one time; the other 5,000 were to come up the next day. Meanwhile McDowell on the morning of the 18th reached Centreville, a hamlet three or four miles from Bull Run, having left behind Gen. Runyon with 5,000 men to guard his communications with Washington. During the day a reconnoissance was made down the stream, and a skirmish took place at Blackburn's Ford, each side losing about 60 men. McDowell on the 19th learned that the enemy had fallen back to the other side of the run, and were posted for some 8 m. upon its opposite bank. There were fording places at intervals of two or three miles, but for 10 miles there was only a single bridge, over which the turnpike from Centreville ran westward. This bridge, defended by an abatis, was at the extreme left of the confederate line, their main force being posted below. McDowell proposed to cross the run with a part of his force, by fords above the confederate left, and then, marching down the western bank, to clear the bridge, by which the remainder of his force should cross. This movement was begun before daybreak on the morning of the 21st. On the preceding evening McDowell had about 31,000 men at Centreville; but the term of the 4th Pennsylvania regiment, and of a battery attached to the New York 8th, expired that evening, and they insisted upon being discharged. Deducting these and the sick, McDowell had about 28,000 men. The confederates had 27,838; in the course of the battle they received about 8,000 more, being a part of those left behind by Johnston. By half-past 9 Burnside, who had the advance of one turning column, was discovered moving down the west bank of the run toward the bridge. Johnston then ordered that his own right should cross the run in force and fall upon the weak federal flank and rear; but the order miscarried, and the battle assumed an aspect not contemplated by either commander. Burnside had been checked for a short time at a plateau, around which Young's branch, a brook falling into Bull Run, curves in a sickle form; but with the aid of Sykes's regulars, Sherman's brigade of Tyler's division, which had crossed the run by a ford just above the bridge, and Porter's brigade, which came upon the field by a wide detour, he drove the confederates in confusion almost to the edge of the plateau. Here they were met by Jackson, who was bringing up his five regiments. Behind these the confederates rallied. It was now past noon. Burnside's brigade, having exhausted its ammunition, was withdrawn to replenish, and took no further part in the battle. Hunter, Heintzelman, and Sherman had gained the upper edge

of the plateau, outflanking Jackson. Keyes's brigade of Tyler's division had crossed directly after Sherman, and was menacing the lower edge, while Howard's brigade had secured the now undefended bridge; it needed only to remove the abatis to enable the remainder of Tyler's division, under Schenck, to be brought up. In all 18,000 men had passed the run, and were on or near the plateau, whereon were barely 7,000 confederates, the remainder of their force being stretched for miles down the bank of the stream. Johnston and Beauregard now came up, only, as it seemed, to find a lost battle. But the serious attack by the Union force was delayed a half hour too long; by that time the confederates had been able to concentrate 9,500 men, with 22 guns, on the immediate field; against them were directly moving 13,000 with 18 guns. The strongest position of the confederates was a slight swell, which was commanded by one a little higher near by. The batteries of Ricketts and Griffin were ordered to this, having as support the New York regiment of zouaves. The zouaves, coming in sight of a confederate regiment half hidden by a clump of pines, and of two companies of cavalry riding toward them, broke into confusion, and the cavalry rode straight through their ranks. The batteries, now supported by a Minnesota regiment, moved on, and almost gained the commanding position; but the enemy were there at the same moment. The horses of the batteries were shot down, and a hand-to-hand fight took place for the possession of the guns, which were three times captured and recaptured, and finally remained in the hands of the Unionists, but could not be brought into use. Meanwhile Keyes's brigade, on the right, had moved up the northern slope of the plateau, and for a moment the leading companies gained its crest, from which they were driven by the fire of a light battery; they skirted the base of the hill, but always found themselves confronted by the battery. This movement, lasting an hour, carried the brigade two miles from the scene of action. At 4 o'clock the advantage seemed clearly on the Union side, and McDowell ordered an attack upon the centre, which he hoped would decide the day. But at the very moment his whole right came rushing down in confusion. The confederates had struck a blow from an unexpected quarter. Ever since noon Beauregard had commanded on the plateau, while Johnston took a post in the rear from which he could overlook the whole field, and direct the reinforcements as they came up. At 2 o'clock Kirby Smith's brigade, which had been left behind the previous day, came in sight. Johnston hurried up every regiment; some were sent to strengthen Beauregard's line, which began to advance; others, with Smith's brigade, were hurled upon the flank and rear of the Union right, which was driven in upon the centre, now moving to attack. In a quarter of an hour all was over. The plateau was swept clear, and the whole

Union army streamed wildly back toward the bridge and fords. The eight companies of regulars alone kept anything like military order. In retreating they presented a firm front, and checked the pursuit until the fugitives had gained a fair start. The confederate infantry was in no condition to make a vigorous pursuit; half of them had been engaged for hours, and the rest were exhausted by long marches. Some regiments pursued for a mile, and were then recalled, only a few hundred cavalry and a light battery keeping up the chase. By one route or another the fugitives crossed Bull Run, and reached the turnpike leading to Centreville. This was crossed by a brook, over which was a narrow wooden bridge. A crowd of sight-seers from Washington had come thus far in carriages and on horseback, to look upon a battle which they had been told was already a victory. A cannon shot overturned a caisson which was crossing the bridge, and blocked the way. The artillery horses were cut from their traces, and the drivers mounting rode through the throng. Finally the crowd got over the stream, some by the bridge, others by wading, and hurried to Centreville, where Miles's division had remained all day. The pursuing horsemen were checked by the sight of a regiment of these, drawn up across the road. It was now evening. A hurried council of war was held, and it was determined to fall back to Washington; but the routed regiments were already on their way, and reached the capital before daylight next morning. In six hours of darkness they had traversed a distance which it had taken them 40 hours to accomplish in their advance. The federal loss is officially stated at 2,952, viz.: killed, 481; wounded, 1,011; missing, 1,460. As the dead and those severely wounded were left on the field, many of those reported as missing were undoubtedly killed or wounded. The confederates reported the capture of 1,421 prisoners, of whom 871 were unwounded. The Unionists also lost 20 cannon, 4,000 muskets, 4,500 sets of accoutrements, and a considerable quantity of ammunition. The confederates lost 378 killed, 1,489 wounded, 80 missing; in all, 1,997. II. August 29-30, 1862. While Gen. McClellan was prosecuting his operations in the peninsula, a considerable force had been left in northern Virginia. At the close of June these troops were organized as the army of Virginia, and put under the command of Gen. Pope, while Gen. Halleck as general-in-chief was placed in supreme control of all the armies in the field. Pope collected his forces, and began to demonstrate upon the Rappahannock and Rapidan. To counteract his movements, Lee sent thither Jackson and Ewell, with a third of the army at Richmond. On Aug. 9 a sharp but indecisive encounter took place at Cedar mountain. Halleck ordered McClellan to withdraw from the peninsula, and Lee thereupon moved nearly his whole army northward, hoping to fall upon Pope before he could

be reinforced from McClellan. He had about 85,000 men. Pope, who had 45,000, fell back beyond the Rappahannock; and on Aug. 30 the two forces were in front of each other, upon opposite banks of the river, Lee trying to find an unguarded place to cross. On the night of the 22d Stuart made a bold cavalry dash around the right of Pope, and reached Catlett's station, 10 miles in the rear, near which were the Union headquarters. To this Stuart was guided by a negro. He seized Pope's personal baggage, in which was his despatch book, containing information as to the number and position of the whole federal force. This raid, which cost only a single life, shaped the operations of the ensuing campaign. Lee was persuaded that if he could throw his force upon Pope's rear, cutting him off from Washington, his whole army might be captured. To effect this he must divide his own force, a part remaining in the enemy's front, while the other moved rapidly around to his rear. Jackson, with about 30,000 men, set off on the morning of the 25th, moving up the western side of the Bull Run mountains, which lay between him and the Union posts. A forced march of 20 miles brought him to Thoroughfare gap, by marching through which he would gain the Union rear. The pass, which could have been held by a small force, was unguarded. Jackson went through on the morning of the 27th, and by sunset was at Bristoe station, on the Orange railroad, which formed Pope's main source of supply. At Manassas Junction, 7 miles distant, was a large depot of provisions: these were seized by a small body of cavalry, and destroyed. Lee had remained with Longstreet's division in front of Pope. On the 26th this division set out to follow Jackson, moving, however, much more slowly. Pope divined the object of the movement, and began to fall back toward Manassas, whither Jackson had moved, leaving Ewell at Bristoe, where he was attacked on the 27th by Hooker. The engagement was slight, but it showed Jackson that his movement was not a surprise, and that he was in peril of being surrounded by the enemy, who were moving by several routes toward Manassas. His only alternative was to fall back toward Thoroughfare gap, and take a position which he could hold until Longstreet should come up. To blind the enemy he moved northeastward to Centreville; then turning sharply to the west, he crossed Bull Run, and took post about a mile N. W. of the battle field of the preceding year. The position was strong, the abandoned cuttings and embankment of a railroad forming an excellent intrenchment which protected his whole front. Pope had by this time 54,000 infantry, still considerably scattered, and 5,000 cavalry, whose horses were so worn out that scarcely 500 were fit for service. On the evening of the 28th McDowell, who was moving near Jackson's extreme right, was met by a sharp artillery fire. There was some loss on both

les, but no real battle. Pope, supposing that Jackson was in full retreat, hoped now to be able to deal him a crushing blow before he could effect a junction with Longstreet, supposed to be at least two days distant. The attack was opened early on the morning of the 29th. Sigel's corps on the Union left advanced, driving the confederate skirmishers; but on reaching the embankment it met a fierce musketry fire from which it recoiled, pursued by the enemy, who were in turn driven back by the artillery. At the same time continuous fighting was going on along the whole line, especially at the extreme confederate left, which was at first rather weakly held; but it was soon reinforced by Longstreet, who, instead of being miles away, had passed through Thoroughfare gap early that morning. In the mean while Pope, perceiving his advantage, and the necessity of improving it, ordered Fitz John Porter, then within hearing of the battle, to advance with his corps to the attack. This order was also given to Porter by McDowell; but for some reason Porter did not reach the field that day. He was afterward brought to trial and cashiered. Pope had gained a great advantage, which could not have been jeopardized by the help of Porter's corps, and might have been made conclusive of the action by vigorous coöperation on the part of his subordinates. At nightfall Jackson's extreme left was considerably drawn in toward the centre, a movement which had the aspect of a retreat. On the morning of the 30th neither commander was eager to begin the action; but toward noon a prisoner who had escaped told Pope that he had left the enemy in full retreat, and Pope gave orders for a vigorous pursuit. The whole confederate force was now massed in the form of an irregular L, Jackson's command forming the longer line, and a part of Longstreet's the shorter; this was hidden by low wooded ridges, with a considerable interval between it and Jackson; the reserve, consisting of about half of Longstreet's corps, were in the rear. Pope, ignorant of Longstreet's presence, moved straight upon the railway embankment, where scarcely an enemy was to be seen. The corps of Reno and Heintzelman, on the left, encountered a hot fire from an almost invisible foe, before which they recoiled into the woods. Fitz John Porter's corps, which up to this time had taken no part in the events of the campaign, was directed upon Jackson's right, their line of march going past Longstreet's position, which thus lay upon its flank. Porter's assault was so vigorous that Jackson called for aid. But Longstreet had perceived his advantage, and, instead of sending men to Jackson, opened with all his batteries upon Porter, and in a few minutes advanced his infantry. Porter, outnumbered three to one, was swept back straight across the plateau toward Bull Run. Jackson simultaneously advanced his line, pressing back Reno, Heintzelman, and McDowell. The angle between the confederate wings gradually less-

ened, the sides seeming to enclose Pope's army like a vice. The Union retreat threatened to become a rout. But Warren, then a colonel, with a weak brigade of Porter's corps, seized a commanding eminence, from which another Union brigade had just withdrawn. This he held until he was enveloped on three sides, holding the confederates in check for a brief space, and then fell back. Out of just 1,990 men he lost 412, of whom 387 were killed and wounded. The breathing space thus gained enabled the army to retreat in fair order across Bull Run, and thence to Centreville. Several of Pope's brigades had that morning missed their way, and were not present in the action of the 30th; and there had also been much straggling from the ranks. Pope's whole force there was 40,000, of whom about 35,000 were engaged. The entire confederate force present was about 65,000; but the reserves, about 19,000, were not brought up, leaving 46,000 actually engaged. Lee's general report makes the confederate loss 1,090 killed and 6,514 wounded; this appears to be imperfect, for the detailed reports of Longstreet and Jackson enumerate 1,340 killed and 7,060 wounded, 8,400 in all. Only partial reports of the Union loss were given; these indicate a total of about 11,000 killed and wounded; besides these were many prisoners, mostly stragglers picked up after the fight. Lee claimed to have taken 9,000 unwounded prisoners. On the morning after the battle Lee had about 60,000 effective men, to which on the following day were added D. H. Hill's division, about 10,000 strong, which came up from Richmond. Pope, at Centreville, had received considerable reinforcements, including his missing brigades, Banks's corps of 5,000, belonging to the army of Virginia, with Sumner's corps of 11,000, and Franklin's of 8,000 from the army of the Potomac; in all he had 62,000, to which 20,000 more might have been added in two days. During the night of Sept. 2 Jackson made a reconnoissance toward Washington, and an encounter took place at Ox Hill, near Chantilly, in which the Union generals Stevens and Kearny were killed. The civil and military authorities were so apprehensive of an attack upon the capital, that they ordered the whole army to fall back behind its defences. Pope, at his own request, was relieved from the command, which was given to McClellan.—By the confederates the two battles near Bull Run are styled the first and second battles of Manassas. Some Union authorities give the name of Bull Run to that of 1861, and Groveton to that of 1862, from a hamlet near the battle field.

BÜLOW. *L. Friedrich Wilhelm*, baron von, count of Dennewitz, a Prussian soldier, born on the family estate of Falkenberg, in the Altmark, Feb. 16, 1755, died in Königsberg, Feb. 25, 1816. He entered the army in 1769, and in 1813 was lieutenant general on the opening of the war of independence against Napoleon. At Grossbeeren he achieved his second victory

over Oudinot, and near Dennewitz, Sept. 6, commanding under Bernadotte, he defeated Ney, for which the king made him grand knight of the Iron Cross. At the close of the battle of Leipsic, Oct. 19, he was foremost in storming the gates of the city. He drove most of the French out of Belgium and Holland, and effected a junction with Blücher in Champagne, March 4, 1814, after having captured Lafère and Soissons. He had a prominent share in the victory near Laon, took Compiègne, and held the Montmartre while the allied troops entered Paris. For these achievements he was made general of infantry and count of Dennewitz, with estates valued at 200,000 thalers. He contributed essentially to the victory of Waterloo, by bringing up the 4th corps, in forced marches, to reinforce Blücher; and Wellington fully acknowledged his services. He was equally accomplished in the theory and practice of military science, and was respected for his virtues. Frederick William III. erected in Berlin a marble statue in honor of his memory. Varnhagen von Ense wrote *Leben des Generals Grafen Bülow von Dennewitz* (Berlin, 1854). II. **Adam Heinrich Dietrich**, baron von, a military writer, brother of the preceding, born at Falkenberg about 1757, died probably in Riga in 1807. He was educated at the military academy in Berlin. After having acted with the insurgents in the Netherlands against Joseph II., he devoted himself in Germany to the stage, and twice visited the United States. He was unsuccessful in a business speculation, and after his return to Germany published a very unfavorable account of this country, *Der Freistaat von Nordamerika in seinem neuesten Zustande* (2 vols., Berlin, 1797). His principal publication is his anonymous *Geist des neuen Kriegssystems* (Hamburg, 1799; 3d enlarged ed., 1835), from which he hoped for official employment. Not obtaining this, he engaged in a newspaper enterprise in London, where he failed, and was imprisoned for debt until his brother the general came to his relief. He next led a restless life in France, from which he was expelled in 1804. He was afterward imprisoned in Berlin and Kolberg, at the request of the Russian government, which had taken umbrage at the personalities of his *Geschichte des Feldzugs von 1805* (2 vols., Berlin, 1806), and was eventually surrendered to the Russians. He wrote many other military works, contributed to military periodicals, and published *Leben des Prinzen Heinrich von Preussen* (2 vols., Berlin, 1806). His father became a Swedenborgian in the latter part of his life, and Baron Adam left a posthumous work on Swedenborgianism, *Nunc permissum est: Coup d'œil sur la doctrine de la nouvelle Église chrétienne* (Kolberg, 1809).

BÜLOW, **Hans Guido von**, a German pianist and composer, born at Dresden, Jan. 8, 1880. His father, Karl Eduard von Bülow (1807-'58), was a novelist and poet. The son commenced the study of music at an early age as an ama-

teur, being intended by his father for the law; but as his tastes became more decided, he finally, by the advice of Liszt and Wagner, abandoned his law studies at Berlin, and devoted himself to music. His father, displeased at this decision, refused him support; but both Wagner and Liszt gave him assistance, the former obtaining for him in 1850 the position of chief of orchestra of the theatre at Zürich, where the operas *Tannhäuser* and *Lohengrin* were being performed. In 1851 he went to Weimar, and studied the piano and composition for two years under Liszt's direction. In 1852 he played for the first time in public, at a musical festival in Ballenstedt; and in the same year his overture to "Julius Cæsar" was performed for the first time, and he became one of the editors of the *Neue Zeitschrift für Musik* of Leipsic, advocating the progressive school of which Wagner was the chief. He succeeded Kullak as first professor of the piano at the Berlin conservatory in 1855. In 1857 he married Cosima, natural daughter of Liszt and the countess d'Agoult. In 1858 he was appointed court pianist at Berlin. In 1864 he went to Russia, where he made a great reputation as a pianist and orchestral conductor. In 1867 he became chapelmaster and director of opera to the king of Bavaria. His wife having deserted him for Wagner, Von Bülow in 1869 obtained a divorce in the Bavarian courts; and in December, 1872, she married his former friend. Von Bülow's works are nearly 80 in number, the most celebrated among them being his overture and music to "Julius Cæsar," "The Minstrel's Curse" for orchestra, and "Nirwana," a composition founded on an Indian legend. Besides these he has composed songs and choruses and numerous pianoforte pieces, the most popular of which have been transcriptions from Liszt, Wagner, Berlioz, Handel, and Bach. As a conductor of orchestra he has no superior in Europe. As a pianist his only rival is Rubinstein, since Liszt no longer appears in the concert room. An extraordinary character-

istic of the man is that he never plays his own compositions in public.

BULRUSH (*Scirpus lacustris*, Linn.), an aquatic plant, with a large cylindrical stem from 3 to 8 ft. high, the sheath often bearing a small, linear, awl-shaped leaf, and the culm tipped with an erect and pointed involucre leaf. It has numerous spikes in a compound umbel-like panicle, and ovate sword-shaped scales.



Bulrush.

It is a native of Europe, and is now common in rivers and ponds on the continent, in England, North America, and New South Wales. The root was formerly used in medicine for its stringent and diuretic qualities. The leaves and stem are tough and fibrous, and are employed for thatching, and for making matting and chair bottoms.

BULTI, *Baktistan*, or *Little Tibet*, a state of central Asia, tributary to the rulers of Cashmere, in the N. W. part of the Himalaya, on the N. slope of the chain, and in the valley of the Indus; area estimated at 12,000 sq. m.; pop. about 75,000. It is a table land 6,000 ft. above sea level, and the surrounding peaks rise 7,000 ft. higher. The climate is therefore cold, though European fruits abound. The inhabitants are Tartars, and their religion Mohammedan. The land was made tributary by Gholab Singh about 1846. Until then it was an independent state, the last ruler having been Ahmed Shah. The capital is Iskardoh, on the Indus.

BULWER, *Edward*. See **BULWER-LYTTON**.

BULWER, *Henry Lytton Earle*, Baron Dalling and Bulwer, an English diplomatist and author, brother of Lord Lytton, born in 1804, died in Naples, May 23, 1872. He entered the diplomatic service at Vienna in 1829, and after being secretary of legation at Brussels, Constantinople, and Paris, was minister at Madrid from 1843 to 1848, when Narvaez charged him with intermeddling in the liberal interest with the domestic politics of Spain, and insisted upon his recall. Isturiz, the Spanish ambassador in London, was thereupon sent away by the English government, and diplomatic relations between the two countries were interrupted for nearly two years. Bulwer was created a knight grand cross of the bath, and Narvaez is said to have eventually apologized to him, at the instigation of Lord Palmerston. He married in 1848 a daughter of Lord Cowley and niece of Wellington. From 1849 to 1852 he was minister at Washington, where he negotiated the so-called Clayton-Bulwer treaty for the settlement of the Nicaragua canal question, which was ratified July 4, 1850. He represented Great Britain at Florence from 1852 to 1856, was subsequently sent on a special mission to the Danubian principalities, and held the post of ambassador at Constantinople from 1858 to 1865. While in that city he was grand master of the freemasons, and often delivered public addresses, in which he excelled. He was liberal in his political views, and was elected a member of parliament for Wilton in 1830, for Coventry in 1831, and for Marylebone in 1834, retiring in 1837. He was a member for Tamworth from December, 1868, to March 23, 1871, when he was raised to the peerage. Among his writings are: "An Autumn in Greece" (1826); "France, Social, Literary, and Political" (2 vols., 1834); "The Monarchy of the Middle Classes in France" (2 vols., 1834-'6); "Life of Lord Byron," pre-

fixed to a Paris edition of the poet's works (1835); "Historical Characters: Talleyrand, Cobbett, Mackintosh, and Canning" (3 vols., 1868); and "Life and Letters of Lord Palmerston" (2 vols., 1870). The last reaches to 1848, and he left in MS. a continuation of the work to 1851-'2. He had also finished the greater part of an essay on the first Sir Robert Peel, which, with a sketch of Lord Brougham's career, was to be included in an additional volume of his "Historical Characters."

BULWER, *John*, an English physician of the 17th century, author of several works on dactylology. Although he was not himself an instructor of deaf mutes, he was the first in England to indicate the proper plan on which all subsequent methods for the instruction of the deaf and dumb have been based. In 1644 he published "Chironomia, or the Art of Manual Rhetoric," and "Chirologia, or the Natural Language of the Hand," which obtained for him the surname of "the Chiroscoper." His principal work is "Philocophus, or the Deafe and Dumbe Man's Friend; exhibiting the philosophical verity of that subtle art which may inable one with an observant eie to heare what any man speaks by the moving of his lips," &c. (London, 1648). This title illustrates his plan for a labial alphabet and articulation, as his former works exhibited his plans for a manual alphabet and imitative signs. Among his other curious works are "Pathomyotomia, or a Dissection of the Significative Muscles of the Affections of the Mind" (12mo, London, 1649), and "Anthropo-metamorphosis, Man-transformed, or the Changeling" (4to, 1653).

BULWER-LYTTON. **I. Edward George Earle Lytton**, Baron Lytton, an English novelist, born in May, 1805, died in London, Jan. 18, 1873. He was the youngest son of Gen. Bulwer, of Heydon Hall and Wood Dalling, Norfolk, who belonged to an ancient family of Norman origin, and whose wife, Elizabeth Barbara Lytton, was sole heiress of the Knebworth estates. Gen. Bulwer died while his son was young, and the child was brought up by his mother, who died in 1844. His education being perfected by private tutors, he entered Trinity hall, Cambridge, where he graduated in 1826. At the university he gained the chancellor's prize for English versification by a poem on "Sculpture" (1825). He occupied his vacations by pedestrian tours through England and Scotland, and by a jaunt on horseback over a great part of France. In 1826 he published "Weeds and Wild Flowers." In 1827 appeared a Byronic poem, entitled "O'Neill, or the Rebel." His first novel, "Falkland," was published anonymously in 1827, followed in 1828 by "Pelham, or the Adventures of a Gentleman." "Pelham" was adversely criticised in many quarters, but conveyed a general impression of originality and power. Next came "The Disowned," and in 1829 "Devereux;" in 1830, "Paul Clifford;" and in the

next year a satirical poem entitled "The Siamese Twins." "Eugene Aram" appeared in 1832; "England and the English" in 1833; "The Student" in 1835. Previous to this he had been for some time editor of the "New Monthly Magazine." In 1834 appeared "The Pilgrims of the Rhine" and "The Last Days of Pompeii;" in 1835, "Rienzi, the Last of the Tribunes." In 1837 he published "Athens, its Rise and Fall," a work of historical criticism; and in 1838 "Ernest Maltravers" and the continuation of the same, "Alice, or the Mysteries." "Leila, or the Siege of Granada," appeared in 1840; "Night and Morning," 1841; "Zanoni," 1842; and "The Last of the Barons," 1843. In 1836 he first entered the lists as a dramatic writer. "The Duchess de La Vallière" was a failure, but "The Lady of Lyons" and "Richelieu" were very successful, and still hold the stage. "Money," a comedy, was also well received. "The Poems and Ballads of Schiller," translated into English metre, appeared in 1844. "Lucretia, or the Children of the Night" (1846), another romance, was condemned by the critics as being too full of horrors. Bulwer published a pamphlet in its defence, entitled "A Word to the Public." "The New Timon," a poetical romance of London (1846), passed through three editions in a year, and was regarded as one of the most remarkable poems of the day. "King Arthur," an epic (2 vols., 1848; new ed., 1870), was considered by the author his best work. "Harold, the Last of the Saxon Kings," was published in the same year. In 1850 appeared "The Caxtons," a novel of English domestic life, first published in "Blackwood's Magazine." Meanwhile, in 1844, he had succeeded to the Knebworth estates and assumed the surname of Lytton, and became the heir of the two houses of Lytton and Robinson or Norreys, which latter claim descent from the Tudors and the ancient royal lines of Britain. In 1851 he wrote "A Letter to John Bull, Esq., on Affairs connected with his Landed Property and the Persons who live thereon," expressing protectionist views; it rapidly passed through eight editions. In 1845 he wrote "The Confessions of a Water Patient, in a Letter to W. H. Ainsworth, Esq.," in which he recommended the water cure to overworked literary men. He took great interest in the founding of the guild of literature and art, at whose service he placed a small portion of his estate, and for which he also wrote the comedy "Not so Bad as we Seem, or Many Sides to a Question" (1852). In 1856 he was elected lord rector of the university of Glasgow in opposition to Lord Stanley, and delivered an inaugural address advocating the study of the classics, and rejoicing over the increased weight of British literature in the intellectual balance of the world, as compared with the state of things in the 18th century. He was reelected rector in 1858. Among his more recent works, which were first published

in periodicals, are "My Novel, or Varieties in English Life" (1851); "What will He Do with It?" (1860); "A Strange Story" (1861); "Caxtoniana" (essays, 1865); "The Odes and Epodes of Horace" (metrical translation, 1869); "The Lost Tales of Miletus" (1870); "The Coming Race" (1872); and "The Parisians" (1873). A posthumous novel, "Kenelm Chillingly," was published in 1873. His poetical and dramatic works have been collected in 5 volumes (1852-'4). Many of his writings have been translated into almost all the languages of Europe.—Mr. Bulwer entered the house of commons as member for the small borough of St. Ives in 1831, and joined the ranks of the reformers. In 1832, when St. Ives had been deprived of its representation by the reform bill, he was elected by the city of Lincoln, which he continued to represent till 1841. His efforts to relieve newspapers from the stamp duties and his speeches on the copyright question were the only prominent achievements of his parliamentary career at this period. In 1835 he published a political pamphlet, entitled "The Crisis," which ran through seven editions, and was very serviceable to the whigs. He was created a baronet in 1838. He was defeated by the conservative candidates for the borough of Lincoln in June, 1841, and again in July, 1847. Having reentered parliament as member for the county of Herts in the general election of 1852, as a conservative and supporter of the earl of Derby, he made several effective speeches, and rose to the position of a leader of the party. In 1855 he supported the repeal of the penny stamp duty on newspapers, in opposition to most of his political associates. At the general election of 1857 he was again returned as member for Herts. In June, 1858, he became a member of the Derby cabinet as successor of Lord Stanley in the office of secretary of state for the colonies, which he resigned in June, 1859. He was raised to the peerage as Baron Lytton, July 14, 1866. II. *Edina*, Lady Bulwer-Lytton, wife of the preceding, born in Ireland in 1807. She is a daughter of Mr. Francis Wheeler of Limerick, and was married in 1827. The marriage was unhappy, and a separation took place in 1836. In 1858 she appeared at the hustings in Hertford, and followed her husband's speech of thanks for his election with a violent harangue against him. She was in consequence confined in a private lunatic asylum, but soon released. She early contributed to the periodical press, and wrote several novels, the first of which was "Chevely, or the Man of Honor" (1839). A number of her publications reflect upon her husband and his relatives. III. *Edward Robert Bulwer-Lytton*, Baron Lytton, son of the preceding, born Nov. 8, 1831. He was educated at Harrow and under private tutors in England, studied for a time at Rome, and entered the diplomatic service in 1849 as attaché and private secretary to his uncle Sir Henry Bulwer, then

minister at Washington. He subsequently held similar posts at Florence and Paris; in 1856 was made paid attaché at the Hague, and was transferred to Vienna in 1860. While first paid attaché here, several important missions in connection with Servian affairs were intrusted to him. He was afterward secretary of legation at Copenhagen, Athens (1864), Lisbon (1865), and Madrid (1868). At Copenhagen and Lisbon he acted as chargé d'affaires. Toward the end of 1868 he was made secretary of embassy at Vienna, and in 1872 at Paris. His first poems were published in London in 1856, under the title of "Clytemnestra, and other Minor Poems," and at once attracted attention to his pseudonyme of "Owen Meredith," under which nearly all his subsequent works appeared. In 1859 he published "The Wanderer, a Collection of Poems in Many Lands;" in 1860, "Lucile," a romance in verse; and in 1861, "Serbske Pesme," a collection of Servian songs. A prose romance, "The Ring of Amasis," followed in 1863; "Chronicles and Characters," a volume of poems, in 1868; and in 1869 "Orval, or the Fool of Time," a dramatic poem, based on a Polish work. His wife is a daughter of the late Hon. Edward Ernest Villiers.

BUNCOMBE, a S. W. county of North Carolina, near the Tennessee border; area, 450 sq. m.; pop. in 1870, 15,412, of whom 2,808 were colored. It is occupied in great part by mountains and valleys of the Appalachian system. The Blue Ridge is on or near the S. E. boundary. The French Broad river is the principal stream. The soil is fertile, and affords excellent pasturage. In the N. W. part are celebrated warm springs. The Western North Carolina railroad is to pass through it. The chief productions in 1870 were 66,656 bushels of wheat, 14,704 of rye, 324,566 of Indian corn, 43,799 of oats, 24,347 lbs. of wool, and 30,689 of tobacco. There were 1,966 horses, 4,151 milch cows, 6,433 other cattle, 12,355 sheep, and 16,135 swine. Capital, Asheville.—The phrase "talking for Buncombe" originated with a member of congress from this county. (See AMERICANISMS.)

BUNDELCUND, or the *Bundela Country*, one of the Central Provinces of India, between lat. 23° 52' and 26° 26' N., lon. 77° 53' and 81° 39' E.; area, 18,099 sq. m.; pop. about 2,500,000. It comprises the British districts of Bandah, Hummerpoor, and Calpee, Jaloon, Jeitpoor, Churgaoon, and Gurota, and a number of petty native states and jaghires, all under British protection. *It is a hilly country, traversed by the three ranges of the Bindyachal, Bandair, and Panna, the last of which is rich in diamonds and coal. From these mountains flow numerous rivers, including the Betwah, Tamasa, and Cane, all affluents of the Jumna, which flows along the N. E. boundary. The soil produces almost every kind of grain and fruit known in India. The climate is healthy in

some places, but in others, chiefly in the west, is fatal to Europeans. The chief towns are Calpee, Bandah, Jhansi, Chatterpoor, Jaloon, and Callinger.

BUNGE, **L. Alexander**, a Russian botanist and traveller, born in Kiev, Sept. 24, 1803. He was educated at Dorpat, and, after taking the degree of M. D. in 1825, travelled in Siberia and the eastern part of the Altai mountains, and then joined the mission of the academy of St. Petersburg to Peking, where he acquired an extensive herbarium. In 1833 he made a second Asiatic journey, and in 1834 became professor of botany at Kazan, and in 1836 at Dorpat. In 1857-'9 he made new exploring expeditions. He has published works on the plants of Russia, northern China, Mongolia, and the Altai mountains, *Lehmanni Reliquia Botanica*, and other works. **II. Friedrich Egor**, a Russian jurist, brother of the preceding, born in Kiev, March 13, 1802. He was educated at Dorpat, and since 1831 has been professor of law there. In 1856 he became connected with the imperial chancery at St. Petersburg, in the department for the codification of the private law of Esthonia, Livonia, and Courland. His law writings are numerous and valuable.

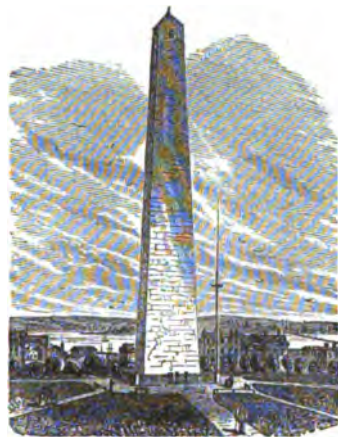
BUNKER HILL, a round, smooth elevation in Charlestown, Mass., 110 ft. high, commanding the peninsula of Boston. It is connected by a ridge on its southern slope with Breed's hill, about 75 ft. high, the crests of the two hills being about 700 yards apart. These heights are famous for the battle fought on them between the British and American forces, June 17, 1775. The city of Boston was at that time occupied by the British under Gen. Gage, who had recently received large reinforcements under Gens. Howe, Burgoyne, and Clinton. Around Boston, having their headquarters at Cambridge, were the minute men of Massachusetts and various bodies of militia and parties of volunteers, as yet independent of each other, obeying their several commanders, knowing little of military discipline, united only by their devotion to the common cause, but of whom Washington in person was soon to take command. Gen. Artemas Ward, the military head of Massachusetts, was however in general regarded as commander-in-chief, while Prescott, Putnam, Gridley, Stark, and Pomeroy, who had learned the art of war in the old contests between England and France, served under him. The beleaguered and now reinforced British had determined to begin offensive operations against the rebels. This design became known in the American camp, where the daring counsels of the officers and the inexperienced eagerness of the soldiers at once suggested the project of anticipating any movement of Gen. Gage. It was determined to seize and fortify the heights of Charlestown on the night of the 16th of June, and Col. William Prescott, of Pepperell, received command of a force of 1,000 men to execute this perilous enterprise. The detachments paraded soon

after sunset on Cambridge common, where prayers were offered up by Langdon, the president of Harvard college. About 9 o'clock they began their march toward Charlestown, and near the isthmus called Charlestown neck were joined by Major Brooks and Gen. Putnam, and by the wagons laden with intrenching tools. Prescott conducted them undiscovered up the ascent of Bunker hill, and thence, after a consultation, to Breed's hill, which was nearer to Boston, and had better command of the town and shipping. There the lines of a redoubt were marked out, and a little after midnight the first sod was thrown up. At dawn a strong redoubt about eight rods square, flanked on the left by a breastwork which extended northerly toward a piece of low land called the Slough, was already completed, and was espied from the ships in the harbor. These immediately brought their guns to bear upon it, and the cannonade awoke the citizens and occupants of the town. Amid an incessant shower of shot and shells, on one of the hottest days of the season, after having toiled all night, and possessing but scanty supplies, the Americans steadily pursued their work till about 11 o'clock. At that time the intrenching tools were removed by Putnam to Bunker hill, with the design of forming a new breastwork there. Prescott strengthened his right flank by some troops thrown into the village of Charlestown at the southern foot of the hill, and on the left, at the very moment of battle, a fortification against musket balls was completed by the intertexture of two rail fences and the new-mown hay of the meadows. While the military din which reached from the streets of Boston announced an impending attack, Prescott repeatedly sent messages to Cambridge asking for reinforcements and provisions, and Putnam went in person to urge the exigencies of the case. Yet Ward hesitated to expose his stores and to risk a general engagement by weakening his main body, and it was not till 11 o'clock that orders from him reached Stark at Medford to advance to the relief of Prescott. This veteran was at the head of 500 New Hampshire troops, and wisely led them on slowly, determined to bring them fresh into battle. He appeared on the heights about 2 o'clock, and took his position on the left to maintain the rustic bulwark which reached toward the Mystic. At the same time Warren arrived, and after declining the command, which was tendered to him by Putnam at the rail fence, and by Prescott on Breed's hill, entered the redoubt as a volunteer, and was cheered by the troops as he selected the place of greatest danger and importance. Already the British army of assault had landed. Gen. Gage had decided, in opposition to a majority of his council, to attack the Americans in front instead of in rear, in the conviction that raw militia would flee before an assault of veterans. About 1 o'clock 28 boats and barges, containing four regiments of infantry,

10 companies of grenadiers, 10 of light infantry, and a proportion of field artillery, in all about 2,000 men, bore away from Boston under cover of a heavy fire from the ships in the harbor, and landed without opposition at Moulton's point, a little north of Breed's hill. Gen. Howe commanded the right wing, which was to push along the bank of the Mystic river, and attempt to force the rail fence, and so to cut flank and surround the whole American party. Gen. Pigot commanded the left wing, which was to mount the hill, and force the redoubt. Reinforcements were on their way toward the American lines all day, but the whole number who arrived in time to take part in the action did not exceed 1,500 men. Prescott commanded upon the redoubt, Knowlton and Stark on the left, and Putnam was active and efficient in various ways, now planning additional fortifications on Bunker hill, now securing the whole peninsula to hurry up reinforcements, and now mingling with, encouraging, and threatening the men at the rail fence. The two columns of the British, after partaking of refreshments, advanced to a simultaneous assault a little after 2½ o'clock. They presented a formidable appearance, and Gen. Pigot's division ascended the hill in good order, discharging their musketry, and galled only by a flanking fire from the Americans in Charlestown. The men in the redoubt, obedient to the strict command of Prescott, withheld their fire till the enemy had approached within eight rods, when a tremendous volley was discharged, and nearly the whole front rank of the British fell. The assailants, recoiling for a moment, again advanced, and were met by a second volley more effective than the first. The Americans were all marksmen, and for a few minutes an unremitting fire was kept up between the two armies, till the British staggered and retreated in disorder, some of them even to their boats. Gen. Howe's division had in like manner moved gallantly forward, been received at the distance of nine rods by a deadly fire from the whole line of the rail fence, and forced after a struggle into confusion and a precipitate retreat. The moments following this first check were employed by the American officers in cheering and praising the men. Meantime Charlestown neck, over which recruits were hurrying to the action, was raked by an unceasing discharge of balls and bomb shells from the neighboring British batteries and ships; the village of Charlestown, from which so much annoyance had been experienced in the first attack, was set on fire by shells thrown from Copp's hill, and its 500 wooden edifices burst into a blaze; and amid the confusion of this scene the British began their second attempt to storm the redoubt, firing musket shots as they ascended the hill. The Americans reserved their fire till the enemy was within six rods, and then a volley aimed with the skill of sharpshooters did its accustomed execution. The British, however,

pressed boldly forward in the face of a continuous stream of fire, but staggered before reaching the redoubt, and, in spite of the remonstrances, threats, and even blows of the officers, again gave way, and retreated in greater confusion than before, leaving some of their dead within a few yards of the works. The grass fence on the left was at the same time maintained against Gen. Howe, whose division suffered severely in loss of men and officers. The crowd of spectators on the opposite shore beheld with astonishment the successful stand of raw militia against veteran regulars. Gen. Clinton, who from Copp's hill had watched the action, now hurried over as a volunteer with reinforcements. The terrible scene was new to the American troops, yet they answered with cheers when Prescott cried, "If we drive them back once more, they cannot rally again." But it was now discovered that the ammunition was nearly exhausted, and when the engagement was renewed the Americans had each only from one to four charges of powder left, and not more than 50 bayonets in all. The British advanced in three divisions, from the south, east, and northeast, and when close at hand received the same murderous volley as before. They advanced with fixed bayonets, and the American fire immediately slackened. The last round of ammunition shot down those of the enemy who first mounted the parapet, one of whom was Major Pitcairn. There was for some time a hand-to-hand struggle carried on by the Americans with their few bayonets, the stocks of the muskets, the barrels after the stocks were broken off, and even with stones, till the wings of the British getting into the rear of the redoubt, a little before 4 o'clock Prescott gave the order for retreat. He himself was one of the last to leave the redoubt, parrying with his sword bayonets which pierced his coat, and his men cut their way through the two divisions by whom they were nearly surrounded. They received a destructive volley as they left the redoubt, and Warren fell shot through the head with a bullet. Stark and Knowlton maintained their station at the rail fence till the troops of Prescott had left the hill, and then retired slowly, Pomeroy, a veteran of 70 years, firing back upon the enemy till his musket was shattered by a ball. The retreat was across Bunker hill, where they were encountered by Putnam, who had been collecting reinforcements, and who sought in vain to rally them to make a stand at the unfinished works which he had constructed. The retreat was harassed by a raking fire from the British ships and batteries, but there was no pursuit beyond Charlestown neck. Putnam, who had assumed the supreme direction after the retreating forces left Bunker hill, rallied a portion of the fugitives, and encamped that night on Prospect hill. Prescott repaired to headquarters at Cambridge, and was so little discouraged that he offered with three

regiments to recover his post. Indeed, the result of the battle, though a defeat, had all the moral effect of a victory. The loss of the British in killed and wounded, by the account of Gen. Gage, was at least 1,054, among whom were 70 commissioned officers wounded and 13 killed. The whole loss of the Americans was 145 killed and missing, and 804 wounded. The death of Warren, one of the most guileless and ablest of patriots, caused profound and universal sorrow.—In the centre of the grounds included within the redoubt on Breed's hill now stands the obelisk known as Bunker Hill monument. It is a square shaft, built of Quincy granite, 221 ft. high, 31 ft. square at the base, and 15 at the top. Its foundations are enclosed 12 ft. under ground. Inside of the shaft is a round hollow cone, 7 ft. wide at the bottom and 4 ft. 2 in. at the top, encircled by a winding staircase of 294 stone steps, which leads to a chamber immediately under the



Bunker Hill Monument.

apex, 11 ft. in diameter. This chamber has four windows, which afford a wide view of the surrounding country, and contains two cannons, named respectively Hancock and Adams, which were used in many engagements during the war. The cornerstone of this monument was laid on the 50th anniversary of the battle, June 17, 1825, by Gen. Lafayette, then the nation's guest, when Daniel Webster pronounced an oration to an immense concourse of people. There were present on the occasion about 200 soldiers of the revolution and 40 survivors of the battle. The monument was completed in 1842, its entire expense having been over \$150,000; and on June 17, 1843, it was dedicated, Daniel Webster being again the orator.

BUNSEN, Christian Karl Josias, baron von, popularly known as Chevalier Bunsen, a German scholar and diplomatist, born at Korbach, Waldeck, Aug. 25, 1791, died in Bonn, Nov. 28, 1860. His grandfather was a lawyer, but his remoter ancestors were farmers, and in after life Bunsen often proudly referred to his spring-

ing from that kernel of the nation, the cultivated and cultivating class of society. He was the only child of his father by his second marriage with a former governess in the family of the countess of Waldeck. He attended the gymnasium from 1806 to 1808, afterward studied theology at Marburg, and in 1809 entered the university of Göttingen. Here Heyne showed him great attention, and recommended him as a German teacher to young William B. Astor of New York, whose travelling companion he afterward became. In 1811 he went with Arthur Schopenhauer to Gotha, Jena, and Weimar. In April, 1812, he became teacher of Hebrew and Greek in Göttingen. The university awarded a prize to his first literary attempt in Latin, *De Jure Atheniensium Hereditario*. In 1813 he received the diploma of doctor of philosophy from the university of Jena. Subsequently he travelled extensively with Mr. Astor in Germany and Italy. At Vienna he met Friedrich von Schlegel; at Munich, Schelling and Thiersch; and he joined the latter in studying Persian, and read law with Feuerbach. On his return to Göttingen, he and his friends formed the nucleus of a philological and philosophical society, and he pursued a vast system of kindred studies, including Semitic and Sanskrit philology, and perfecting his knowledge of the Scandinavian languages on a visit to Denmark and Sweden. He spent the winter of 1815 and the year 1816 in Berlin, where the preaching of Schleiermacher greatly impressed him, and where he conceived a profound admiration for Niebuhr. He continued his studies of Persian and Arabic in Paris under Sylvestre de Sacy, joined Mr. Astor at Florence, and after the return of the latter to the United States became the French teacher of Mr. Cathcart, an English gentleman. On July 1, 1817, he married at Rome Fanny Waddington, the daughter of an English clergyman, and the plan of an improved German translation of the Bible was first suggested to him by his young wife. Cornelius, Overbeck, Brandis, and Platner were the inseparable companions of the Bunsens, and their modest lodgings in the palazzo Caffarelli on the Capitoline hill, where they lived 22 years, became a resort of many distinguished persons. When Brandis, Prussian secretary of legation, fell ill, Bunsen replaced him, and in August, 1818, was officially appointed to that post. From this time his influence began to be felt alike in the scientific and literary world, and in the political affairs of his time. Frederick William III. of Prussia, visiting Rome in 1824, was pleased with the secretary, and to Bunsen's influence are ascribed several reforms in the state church of Prussia which were decreed by the king during his stay at Rome. Bunsen held that there could be no real church without a liturgy, and no liturgy without a church; and he prepared a Protestant liturgy for public worship, which was approved by the king. In 1824, on Niebuhr's resignation, Bunsen was made chargé d'affaires,

and in 1827 minister. When the European powers endeavored to settle the affairs of the Papal States, he elaborated for the conference the so-called *memorandum del Maggio*. He had obtained from Pope Leo XII. the celebrated brief regulating mixed marriages; but when Gregory XVI. succeeded Leo, a different view of the subject was taken at the Vatican; and then began in Germany, Poland, and all semi-Catholic and semi-Protestant countries, a series of dissensions between the state and the clergy, which ended in the imprisonment of several bishops. Bunsen, failing in his efforts to change the opinion of the pope, withdrew in 1837, and in 1839 became minister to Switzerland. In 1841 he was sent by Frederick William IV. to England to take measures for the establishment of a Protestant bishopric in Jerusalem, and soon after was made ambassador at the court of St. James's. From England he several times visited Berlin; and in 1844, at the request of the king, he presented several memoirs and projects concerning the introduction into Prussia of a representative form of government, modelled as far as possible on the English standard. In 1845 he was made privy councillor, with the title of excellency. After the outbreak in 1848 Bunsen strongly advocated the cause of Schleswig-Holstein against Denmark and published a pamphlet in English, under the title, "Memoir on the Constitutional Rights of the Duchies of Schleswig and Holstein, presented to Viscount Palmerston April 8, 1848." His influence was on the side of the efforts made by the diet in Frankfurt for the union of Germany under the king of Prussia as emperor, and he supported this movement in several pamphlets. In 1849 he participated in the conferences in London relative to the Schleswig-Holstein question, and in 1850 protested against the London protocol which resulted from them as contrary to the interests of Germany. At the beginning of the Crimean war Bunsen's sympathies were with the allies, contrary to those of the Prussian cabinet. This and his opposition to the pietistic tendencies of the Prussian court and government, weakened the favor which for more than 20 years he had enjoyed with Frederick William IV. In England he had endeared himself to the royal family and to many eminent persons, among whom was Dr. Arnold, upon whose death he wrote a memorial which was in 1852 translated into English by Anna Gurney. Bunsen's resignation of the embassy was accepted in April, 1854, after which he resided at Charlottenberg near Heidelberg. He was made a baron and peer in 1857, spent the winters of 1858-'9 and 1859-'60 at Cannes, visited Paris in 1859, and in the spring of 1860 went to Bonn.—During his residence in Rome, in conjunction with Niebuhr, he studied Roman antiquities, and made various historical researches upon the philosophy of language and religion, and their influence in the world's history. Among the fruits of these studies was *Die christliche Ba-*

siliken des christlichen Rom (Munich, 1843). He united the study of Plato's philosophy with Biblical and liturgical labors, and with researches in the history of Christianity; and Champollion, who was then at Rome, assisted him in mastering the Egyptian hieroglyphics. As the result of these labors we have the great work, *Aegyptens Stelle in der Weltgeschichte* (5 vols., Hamburg and Gotha, 1845-'57; English translation, "Egypt's Place in Universal History," 2 vols., London, 1845-'54). The work is divided into five parts, each composing a distinct whole. Most of his other publications bear on theological and political questions. Two critical works on Ignatius of Antioch were followed by "Hippolytus and his Times, or the Life and the Teaching of the Roman Church under the Emperors Commodus and Alexander Severus" (4 vols., London, 1851), which he wrote both in English and in German (2 vols., Leipsic, 1858), and which is considered one of the most eminent productions of the present epoch in theological literature. Among his other works are *Zeichen der Zeit* (2 vols., Leipsic, 1855; English translation, "Signs of the Times," 2 vols., London, 1855-'6), and *Gott in der Geschichte* (3 vols., Leipsic, 1857-'8; English translation, "God in History," 1857). The publication of his comprehensive *Bibelwerk für die Gemeinde* ("The Bible for the Common People") was commenced with the pecuniary assistance of Mrs. Salis Schwabe, a lady of Manchester, and was afterward aided by a contribution from Mr. Astor. It was completed after Bunsen's MS. shortly before his death by Profs. Holtzmann of Heidelberg and Camphausen of Bonn (9 vols., Leipsic, 1858-'70). His correspondence with Frederick William IV., edited by Ranke, was published in 1873. The baroness Bunsen has published "Memoirs of Baron Bunsen" (2 vols., London, 1867; German translation, with additions by Prof. Nippold, 3 vols., Leipsic, 1868-'70).—Baron Bunsen left ten children. Several of his sons are diplomatists, and GEORGE VON BUNSEN, born in Rome, Nov. 7, 1824, is prominent in politics.

BUNSEN, Robert Wilhelm, a German chemist, cousin of the preceding, born in Göttingen, March 31, 1811. His father was professor of oriental languages and literature at the university of Göttingen, and the son, after completing his studies at the gymnasium, entered the university, and devoted himself to the study of chemistry and physics. He took his degree of doctor of philosophy in 1830, afterward studied in Paris, Berlin, and Vienna, and in 1833 became tutor at the university of Göttingen. In 1834 he published, in conjunction with Berthold, his important research upon the hydrated oxide of iron as an antidote to arsenic. In 1836 he was appointed professor of chemistry at the polytechnic school in Cassel, in 1838 at the university of Marburg, and in 1851 at Breslau, where he planned the best working laboratory at that time to be found on the continent; but he did not remain long

enough to complete it, as he accepted in 1852 a call to Heidelberg, where he constructed a still greater laboratory, and has founded one of the most celebrated schools of chemistry in Europe. In 1846 he undertook an important journey to Iceland, during which he devoted special attention to the phenomena of the geysers, examining the waters, the sedimentary deposits, and the gases issuing from the springs. The results of this journey are embodied in a letter to Berzelius written after his return. Bunsen has contributed a large number of original papers to the scientific journals, among the most important of which are those on the cyanogen compounds, examination of the gases of blast furnaces, improvement in galvanic batteries, researches upon kakodyle, preparation of magnesium, aluminum, chromium, and lithium, photo-chemical researches on specific gravity, gas absorption, diffusion, spectrum analysis, and discovery of the new metals caesium and rubidium. His largest independent publications are: "Journey to Iceland," "On a new Volumetric Method," "A Treatise on Gas Analysis," and "Chemical Analysis by the Spectroscope." In the course of his investigations he has invented some of our most important aids to scientific research. Bunsen's battery, Bunsen's burner, Bunsen's photometer, and Bunsen's pump have acquired a world-wide use, and are considered indispensable in every laboratory.

BUNTING, a name given to several birds of the order *passeres*, tribe *conirostres*, family *fringillida*, and sub-family *emberizina*. It is characterized by an acute conical bill, with a straight or nearly straight culmen, and with the lateral margins sinuated; the interior of the upper mandible with a palatic knob; the wings moderate and somewhat pointed; tarsi about as long as the middle toe, and scaled; hind toe robust and longer than the inner; claws slender and generally curved. Among



Black-throated Bunting (*Euspiza Americana*).

the genera are *euspiza* (Pr. Bonap.), of which a well known species is the black-throated bunting (*E. Americana*, Gmel.), with the fore part of the head greenish olive, hind head,

neck, and cheeks dark ash-gray; streak over eye and lower mandible, lower neck, and middle of the breast yellow; chin white, throat black, sides gray, abdomen white, and lesser wing coverts bright chestnut; length 6½ inches; female without the black on the throat. This bird arrives in the New England states from the south about the middle of May, and returns early in September, spending the winter beyond the limits of the United States; it consumes caterpillars, insects, and immense numbers of cankerworms early in the summer; it also eats seeds of various grasses. The nest is made on the ground, and the eggs are five, white, speckled with black. Birds of this genus are found also in Asia, Europe, and South America; they frequent bushes and open cultivated fields, seeking their food on the ground; there are about 12 species described. The genus *emberiza* (Linn.), of which familiar species are *E. hortulana* and *E. miliaria*, contains about 30 species, scattered over the old and new world, especially the former; on the approach of winter they collect in flocks, in which they remain until spring; their habits are the same as those of the preceding genus. (See ORTOLAN.) The genus *pectrophanes* (Mayer) contains four species, among which are the snow bunting (*P. nivalis*, Linn.), and the Lapland lark bunting (*P. Lapponicus*, Linn.), re-



Lark Bunting (*Plectrophanes Lapponicus*).

markable for their long hind toe and very long and nearly straight claw. In winter they live in temperate Europe and North America, going to the far north in spring to breed; they associate in flocks in open mountainous districts, running quickly on the ground in search of seeds, alpine fruits, and insects; the nest is made in fissures of rocks or on grassy hillocks. Other *fringillida*, as many species of sparrows and finches, are in various localities called buntings.

BUNTING, Jabez, D. D., an English clergyman, born in Manchester, May 13, 1779, died June 15, 1858. He was of humble parentage, was educated in the grammar school of Manchester, and became a pupil of Dr. Percival, a physician

of that town. In his 16th year he joined the Wesleyan church, at the age of 19 began to preach, and in 1799 was received into the conference. He spent eight years in Manchester, five in Liverpool, and about 33 in various positions in London. His legal mind and power of broad generalization made him the legislative leader of his connection. To him more than to any other single person were due the conception and realization of the most important measures of the Wesleyan church. He was the first to introduce laymen into the management of the missionary affairs of the church, and also into the district meetings; and it was chiefly by his earnest advocacy that the association of laymen with the clergy on connectional committees having the charge of financial interests was recognized as a principle of Wesleyan polity. He was the first man elected by nomination to the "Legal Hundred," was their secretary ten terms, and was chosen president of the conference four times. To his sagacity and earnestness were largely due the efficiency and success of the Wesleyan missionary society, whose secretary he was for 18 years. At the foundation of the Wesleyan theological school, in 1834, Dr. Bunting was appointed its president, and he remained in this office until his death. Next after Wesley, Coke, and Asbury, Dr. Bunting was the master spirit in settling the ecclesiastical, missionary, and educational policy of the Wesleyan church of England. His posthumous "Sermons" (2 vols. 12mo) appeared in 1861. His life, edited by his son, was begun several years since, but only one volume has appeared.

BUNTZLAU. See BUNZLAU.

BUNYAN, John, an English preacher, born at Elstow, near Bedford, in 1628, died in London, Aug. 31, 1688. His father was a tinker, and brought up his son to the same trade, giving him a very imperfect education. The early biographers of Bunyan attribute to him an idle, vagrant, and dissolute youth; but, although later writers have gone to the other extreme in exaggerating his virtues, the adverse comments on his early life were due in a great degree to Bunyan's own strain of self-condemnation. In after years, when he was made the subject of obloquy and accused of the very vices which he had laid to his own charge, he indignantly defended himself. There is no good reason to believe that his early manhood was stained with gross immorality, and his autobiography, "Grace abounding to the Chief of Sinners," shows that he only adopts the extravagant style of the Puritans. He acknowledges a habit of profane swearing, but says that he was cured of this by a single well-timed rebuke. He appears to have been very fond of playing at tip-cat and dancing on the village-green, as well as ringing the church bells. All these amusements he in time came to look upon as sinful, and bemoaned as if he had committed irreparable evil. At the age of 17 he enlisted in the parliamentary army, but all that is

known of this part of his career is, that he was present at the siege of Leicester, and escaped death by permitting a fellow soldier to take his place as a sentinel. Bunyan always regarded this as a direct interposition of Providence. His military experience was reflected in his writings, especially in his "Holy War," written after the completion of the "Pilgrim's Progress." Soon after the campaign of 1645 he returned home, and in 1647 married the daughter of poor but honorable parents, after which his modes of life were much improved, and he became deeply interested in religion. Distressed by doubts regarding the safety of his soul, he suffered all the horrors experienced by those who imagine themselves for ever shut out from heaven. During the year which he assigns as the period of his greatest terrors, his sufferings were extreme. Now he would imagine that only the Jews could be saved, and again that the Turks and not the Christians were true believers. At last his soul was gradually comforted, and he began to preach to the poor people of Bedford. He had been five years engaged in this occupation when the restoration placed power in the hands of the cavaliers, and he was imprisoned in Bedford jail over twelve years. He was constantly told that if he would give up preaching he should at once be set at liberty, yet he always answered: "If you let me go to-day, I will preach again to-morrow." Not being able to work at his old trade of a tinker, he made tagged laces to support himself, wife, and children, one of whom had been blind from her birth. While thus employed he neglected no opportunity of preaching to the prisoners. He had a most intimate knowledge of the Bible, which, with Fox's "Book of Martyrs," was a constant companion; and such hours as he could devote to composition were now spent in religious writing, many of his papers being against the Quakers, whom he cordially disliked. The misery of his family and his own courage at last prevailed with those in power; the rigor of his confinement was relaxed; he was allowed to preach regularly to a Baptist congregation of which he had been elected pastor; and in 1672 he was freed altogether, through the influence of the bishop of Lincoln. In 1678 he published the first part of his "Pilgrim's Progress from this World to that which is to Come," which had been written in jail. To the corrector of the press he is indebted for some improvement in the syntax and spelling, but not a single scene or line was suggested to him by others. When he had entirely completed the first part, he showed it to some of his friends, and was generally annoyed by their criticisms, they being divided in sentiment whether it should appear or not; but he finally decided to publish it. At first it reached but a small class of the community, although hailed by them with delight; but in the same year a second edition was published with great success. From 10 to 15 editions were issued during the author's life, and he had the satis-

faction of knowing that his work was read by hundreds of thousands in England and Scotland, among the Protestants of Holland, the Huguenots of France, and the settlers of New England. In 1682 he published his "Holy War," now little read, and in 1684 the second part of the "Pilgrim's Progress." He continued to preach without further molestation, and every year made a journey to London, where he drew together at all times vast audiences. He resided in the latter part of his life in Snow Hill (at present Skinner street), near Holborn. His death was hastened by the effects of exposure to the rain in returning from one of his many benevolent errands, and he was buried in Bunhill Fields. The editions of the "Pilgrim's Progress" have been innumerable, and it is said to have been translated into more languages than any other book except the Bible. A collection of Bunyan's writings, with a preface by George Whitefield, was published in 1767, in 2 vols. fol. The most complete edition is that by G. Offor, with a life (3 vols. royal 8vo, 1858). The "Pilgrim's Progress" was edited by Southey, who prefixed to it a life of Bunyan.

BUNZLAU, a town of Prussian Silesia, in the district of Liegnitz, on the Bober, 63 m. W. N. W. of Breslau; pop. in 1871, 8,817. Cloth, linens, tobacco, and earthenware are manufactured here, and there is trade in yarns and in grain. The poet Opitz was born here, and an obelisk to the Russian general Kutuzoff, who died here in 1813, stands in the market place. The town dates from the end of the 12th century. It suffered severely during the thirty years' war.

BUOL-SCHAUENSTEIN, Karl Ferdinand, count von, an Austrian statesman, born May 17, 1797, died in Vienna, Oct. 28, 1865. He was descended from an ancient Grison family, and under the direction of his father, who represented Austria at the diet of Frankfort, he was early introduced into the diplomatic service. He was appointed minister at Carlsruhe in 1828, at Stuttgart in 1838, at Turin in 1844, and at St. Petersburg in 1848. In 1850 he cooperated with Meyendorff in the conferences of Olmütz, and afterward attended those of Dresden. In 1851 he was sent as ambassador to London, and on the death of Schwarzenberg, in April, 1852, he became premier and minister of foreign affairs. It was mainly through his influence that Austria did not join Russia in the Crimean war, and that the treaty of Dec. 2, 1854, was signed. He originated the congress of Paris, and attended it with Hübner to sign the treaty of peace, March 30, 1856. He left office in May, 1859, and was succeeded by Count Rechberg.

BUONAFEDE, Apiano, an Italian philosopher, born at Comacchio, near Ferrara, Jan. 4, 1716, died in Rome in December, 1798. He studied theology in Naples, and joined the order of Celestines, of which he became general in 1777. He ended his life in Rome as abbot of

the monastery of S. Eusebio. As a member of the academy of the Arcadi he assumed the name of Agatopisto Cromaziano, under which he published many of his works. The principal of them, *Dell' istoria e dell' indole di ogni filosofia* (7 vols., Lucca, 1766-'72), and *Della restaurazione della filosofia ne' secoli XVI.-XVIII.* (3 vols., Venice, 1789; German translation with additions by Heidenreich, 2 vols., Leipsic, 1791), treat of the history of ancient and modern philosophy.

BUONAROTTI, Filippo, a French revolutionist, a descendant of Michel Angelo, born in Pisa, Nov. 11, 1761, died in Paris, Sept. 15, 1837. He became a favorite of the grand duke of Tuscany, but was expelled from Italy, and afterward from Corsica, on account of his revolutionary publications. He then went to Sardinia, where, as in Corsica, he advocated annexation to France, and the Sardinians made him draw up for them a liberal constitution. In 1793 he procured the annexation of the small Corsican island of St. Pierre to the French republic, and the convention conferred upon him French citizenship. On the fall of Robespierre, with whom he was intimate, he was arrested, and after his release he conspired for the reestablishment of the constitution of 1793, and became founder and president of a revolutionary society called the *Panthéon*. This being dissolved by the government, he joined the conspiracy of Babeuf, and was sentenced to transportation (1797); but he was ultimately allowed to remain in France under surveillance. In 1806 he went to Geneva, and became a teacher; but in 1815 he was expelled from that city, and went to Brussels, where he published in 1828 his *Histoire de la conspiration pour l'égalité, dite de Babeuf* (new ed., 1850). After the revolution of 1830 he taught music in Paris under the name of Rémond. In 1835 he was one of the defendants in the trial of the insurrectionists of April, 1834.

BUONAROTTI, I. Michel Angelo, an Italian painter, sculptor, and architect, born at the castle of Caprese in Tuscany, March 6, 1474, died in Rome, Feb. 17, 1563, or, according to some authorities, in 1564. He was descended from the family of the counts of Canossa, and was allied to the imperial blood through Count Boniface of Canossa, who married a sister of Henry II. His father, Lodovico Leonardo Buonarrotti Simone, was at the time of the artist's birth governor of Caprese and Chiusi, an important fortress in the commonwealth of Florence. Michel Angelo began early to justify the prediction of the astrologers that he should excel in those arts that delighted the sense, such as painting, sculpture, and architecture. At school he neglected his books for the stolen delight of drawing. A pupil of Domenico Ghirlandaio, with whom he became intimate, procured for him studies, and introduced him to his master's house. In his first attempt at painting, made at this time, a copy from a print representing St. Anthony beaten

by devils, he proved his love for art by coloring his animals as nearly as possible after natural objects. His father, seeing how strong was the bent of his genius, reluctantly consented to place him under the care of Ghirlandaio as a pupil for three years, beginning April 1, 1488, and the master, an unusual thing, agreed to give him 24 florins for his services. When Lorenzo de' Medici opened a garden in Florence for the use of artists, filled with antique statues and busts, Michel Angelo instantly resorted thither; and Lorenzo was so much struck with his first attempt at sculpture, a copy in marble from an old mask of a laughing faun, that he took him under his own patronage, gave him rooms in his palace, and treated him like a son. There the youth studied with zeal and success until his patron's death in 1492. The son of Lorenzo invited him to continue at the palace, and he did so for a time; but missing the encouragement he had received before, and apprehending political troubles, he spent a little more than a year at Bologna. A successful imitation of an antique, a sleeping Cupid, which he made soon after his return to Florence, and which was bought by Cardinal San Giorgio for 200 ducats, was the occasion of his first visit to Rome, where he found liberal patrons, and executed several works, the most distinguished of which is the *Pieta*, now standing as an altarpiece in a chapel near the entrance of St. Peter's. The election of Pietro Soderini as gonfaloniere of Florence, through a change in the government, induced him to repair thither, and in 18 months he produced from an unshapely block of marble, which another sculptor was supposed to have spoiled, the colossal statue of David which stands in the piazza del Gran Duca. Other works undertaken at this time are unfinished or unknown; but a painting, a holy family, believed until recently to be authentic, and his only authentic work in oil, is still in the Florentine gallery. The gonfaloniere also commissioned him to paint a large historical picture for the end of a hall in the ducal palace, Leonardo da Vinci being engaged to fill the other end. The subject chosen by Michel Angelo was taken from the Pisan wars: "Florentine Soldiers Surprised by the Enemy while Bathing." The sketch was greatly admired and was eagerly studied by the most eminent artists, but the cartoon sketch was finished, and that was injured and finally destroyed from neglect. The picture was never commenced, the artist having left it to go to Rome by invitation of Julius II., the new pontiff, who wished to draw around him all the men of genius. The pope gave the artist an unlimited commission to build a mausoleum. The design was too magnificent for the church it was to adorn, and the pope, after some thought, determined to rebuild St. Peter's as a fit covering for his superb monument, which was to be completed according to the original design, and Michel Angelo passed eight months at Carrara procuring the marble. A misunderstanding

with the pope suspended this great work, which, though several times undertaken in after years, was never finished; the parts designed for it, among them the famous statue of Moses, were finally placed in the church of San Pietro in Vincolo. A reconciliation was effected at Bologna in 1506, and in 1508 the artist, after devoting 16 months to a colossal bronze statue of Julius, which the Bolognese afterward converted into a cannon, returned to Rome expecting to resume his labor upon the mausoleum; but the pope had changed his mind, and was now bent upon decorating with frescoes the walls and ceiling of the Sistine chapel, in honor of his uncle Sixtus IV., its builder. With extreme reluctance Michel Angelo consented to execute this undertaking in an untried branch of art. He was not a painter; Raphael could do it better; but the pope's request was a command; so he made the casting, constructed the scaffolding, sent away the fresco painters who had come from Florence, shut himself up alone, and finished the first picture on the ceiling, the "Deluge." The plaster was too wet, and a film obscured the picture; this was easily remedied, and the artist went on. Before the ceiling was half finished the impatient pope had the scaffolding removed that he might see the effect. Notwithstanding this interruption, the whole ceiling was actually painted in 20 months. Michel Angelo was making studies for the other paintings when his patron died, Feb. 21, 1513, and the work was suspended. He would now gladly have resumed his labor upon the mausoleum under the patronage of the deceased pope's nephew, but Leo X. occupied him the whole nine years of his reign in the quarries of Pietra Santa getting out inferior marble for the façade of the church of San Lorenzo in Florence. On the death of Leo, his cousin Giuliano de' Medici (Clement VII.) employed him upon the Medici chapel in the same church, a work which consumed the 20 months of Adrian VI.'s reign, and a portion of Clement's. In 1527-'30 Michel Angelo displayed genius of yet another kind, as an engineer, being engaged in fortifying the city of Florence against assaults of the imperial troops. The city fell, and he restored himself to the pope's favor by promising to complete the two statues for the Medici chapel. Again he was anxious to resume the monument to Julius II., and again he was prevented by the pope, who ordered him to paint the walls of the Sistine chapel. This was in 1533. After much studied delay on the part of the artist, who kept privately at work upon his Julian mausoleum, the "Last Judgment" was opened to the public on Christmas day, 1541, Paul III. being pontiff. He afterward completed two large paintings, the "Conversion of St. Paul" and the "Crucifixion of St. Peter," for the capella Paolina. In the reign of Paul III. this extraordinary man, 70 years old, entered upon a new department of art. San Gallo died in 1546, and he was summoned to succeed him as architect of

St. Peter's. This office he held through five pontificates, accepting no emolument, and nearly all the time crossed and perplexed by the invidious plots of his enemies. With this stupendous work on his hands, he had also to carry forward the palazzo Farnese, construct a palace on the Capitoline hill, adorn the hill with antique statues, make a flight of steps to the church of the convent of Ara Coeli, rebuild an old bridge across the Tiber, and last and greatest, convert the baths of Diocletian into the magnificent church of Sta. Maria degli Angeli. Under Pius IV. St. Peter's was carried up as far as the dome, which was modelled in clay, and carefully executed to a scale in wood. But the architect had no time to direct it. A slow fever attacked him in February, 1563, and in a few days put an end to his life, at the age of nearly 89 or 90. His funeral solemnities were honorable and imposing. His remains, after lying a short time in the church of SS. Apostoli, were conveyed to Florence, and deposited in a vault in the Santa Croce.—Michel Angelo applied himself to every branch of knowledge connected with his twin arts, painting and sculpture. His acquaintance with anatomy was great, and also with the science of mechanics. He was fond of Dante and Petrarch, and was himself a poet of a very high order, his sonnets being among the noblest in that kind of literature. Always a student, always dissatisfied with what he had done, many of his works were left unfinished; but his fragments have educated eminent men. In disposition he was proud and passionate, but high-minded, not greedy of gold, but princely in his generosity. His mind was full of great conceptions, for which he was ready to sacrifice and forego physical comforts. Of his merits as an artist, it is enough to say that Raphael thanked God that he was born in the time of Michel Angelo Buonarrotti. He was of middle stature, of a bony and rather spare frame, broad-shouldered, with a fine complexion, a square and rather projecting forehead, and small hazel eyes; his nose had been broken by a blow received in his youth. His poems were edited at Florence in 1623 by his nephew, Michel Angelo Buonarrotti, and have since passed through many editions. English translations of his writings are contained in E. Taylor's "Michel Angelo considered as a Philosophic Poet" (London, 1846), and of many of his poems and letters in John S. Harford's "Life of Michel Angelo," &c. (2 vols., 1857). See also Vasari's "Lives;" *Vita de Michelangelo Buonarrotti*, by Ascanio Condivi (Rome, 1558; new ed., Pisa, 1823); "Life of Michel Angelo," by Richard Duppa (London, 1806), containing a list of his works; *Histoire de la peinture en Italie*, by Marie Henri Bayle (2 vols., Paris, 1817); and *Leben Michelangelo's*, by Hermann Grimm (2 vols., Hanover, 1860-'63; 2d ed., 1866; English translation, 2 vols., London, 1865). **II. Michel Angelo**, an Italian poet, nephew of the preceding, born in Florence in 1568,

died Jan. 11, 1646. He became a member of the academy della Crusca, assisted in editing its celebrated dictionary, and edited the poems of his uncle. His principal works are two comedies, *La fiera* and *La Tancia*, which were published in 1726 under the auspices of the abbé Salvini.

BUONONCINI. See BONONCINI.

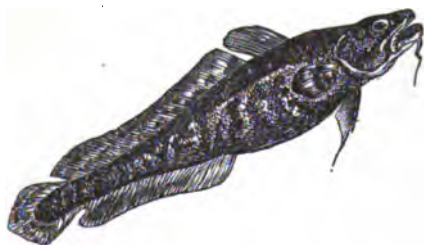
BUPALUS, a Greek sculptor, who flourished in Chios in the latter part of the 6th century B. C. He was the son of the statuary Anthermus, and executed some fine works, several of which in the time of Augustus adorned the temples of Rome. He and his brother Athenis made the use of Parian marble more general, and were the first to group figures in sculpture. They caricatured Hipponax, who revenged himself upon them in his satires.

BUPHAGA, a genus of birds. See OXPECKER.

BURANO, an island and village of Italy, in the lagoon and 5 m. N. E. of Venice; pop. 5,700. The soil is mostly devoted to gardening, and there are manufactories of lace. About half the inhabitants live by fishing.

BURBAGE, or *Burbadge*, Richard, an English actor, died in London, March 13, 1619. He was the son of the actor James Burbage, who was the first to receive in 1574 a royal license as a player. Richard acquired celebrity by his association with Shakespeare, and by his admirable performance of Richard III. and other Shakespearian characters. In the royal license granted in 1603, his name was inserted with that of Shakespeare. Flecknoe calls him a "delightful Proteus," and Sir Richard Baker describes him as the best actor of his day. He is believed to have excelled also as a painter, and to have painted the Felton portrait of Shakespeare.

BURBOT, or *Eel-pout*, a name given, both in England and the United States, to the fresh-water species of the genus *Lota*, of which the ling is the salt-water representative. The anterior dorsal is small, the posterior and the (single) anal long; there are barbels on the chin, as in many others of the cod family. The European burbot (*L. vulgaris*) is from one to two feet long, and ordinarily weighs about 3 lbs.; head flat and smooth; jaws equal; gape large, with small teeth; body compressed posteriorly; tail



Burbot (*Lota vulgaris*).

oval; color yellowish brown, clouded and spotted with darker, lighter beneath. It conceals itself under stones, like the eel, watching for

young fishes and insects brought within its reach by the current; it is very tenacious of life. The flesh is firm, white, and well flavored. The spotted burbot (*L. maculosa*) of the lakes and rivers of northern America is of about the same size, and with similar habits. The eelpout (*L. compressa*) of New England is smaller. (See LING.)

BURCKHARDT, Johann Karl, a German astronomer, born in Leipsic, April 30, 1773, died in Paris, June 22, 1825. He studied at the university of Leipsic, and at Gotha under Zach, by whom he was recommended in 1797 to Lalande at Paris, where he was appointed in 1799 adjunct professor in the bureau of longitudes, and after the death of Lalande, in 1807, became director of the observatory of the military school. He distinguished himself by his calculations of the orbits of comets, translated into German the first two volumes of the *Mécanique céleste* of Laplace (Berlin, 1801-'2), published many astronomical tables, and wrote valuable memoirs for the academy of sciences, one of which, on the comet of 1770, won a prize. His lunar tables (1812) are considered among the best of their kind.

BURCKHARDT, Johann Ludwig, a Swiss traveller, born in Lausanne, Nov. 24, 1784, died in Cairo, Oct. 17, 1817. After studying at Leipsic and Göttingen, he went to England in July, 1806, where an introduction from Blumenbach made him acquainted with Sir Joseph Banks, who, with the other members of the African association, accepted his offer to explore Africa. He studied Arabic for several years in London and Cambridge, and in 1809 sailed for Malta, where he disguised himself as an Arab merchant, assuming the name of Sheikh Ibrahim ibn Abdallah. Thence he proceeded to Syria and joined a caravan to Aleppo, where he remained for some time, gaining such a knowledge of the eastern character, customs, and languages, that afterward in times of trial and danger he was able to pass not only as a genuine but as a learned Mussulman. In the latter half of 1810 he visited Palmyra, the Lebanon, Hermon, and other localities, and explored the Hauran, where he found many vestiges of ancient cities and Greek inscriptions. In January, 1811, he undertook excursions into the desert toward the Euphrates, and on one of these occasions was robbed. In February he again repaired to Damascus, made another journey into the Hauran, transmitted an account of his discoveries there to England, and on June 18 departed for the Dead sea. He explored its shores, visited many interesting localities in its vicinity, and subsequently the ruins of Petra, which no modern European traveller had explored before him. Proceeding toward Akaba, he joined a small caravan, crossed the desert of Et-Tih, and, passing a short distance to the north of Suez, journeyed on to Cairo. He then visited the principal ruins of the Nile and the temple of Ipsambul. On March 2, 1814, he joined at Esneh a caravan of about

50 slave dealers, and after suffering innumerable trials and privations, he arrived at Jiddah, July 18. Mehemet Ali penetrated his disguise, but relieved him in his pecuniary distress, and permitted him to make a pilgrimage to Mecca, where he arrived Sept. 9; and after making also a pilgrimage to Mount Arafat, he visited Medina, and, barely escaping from the plague, finally returned to Cairo, June 24, 1815. He then undertook a journey into lower Egypt, and in 1816 visited and ascended Mount Sinai. He was about to join a caravan for Fezzan, with a view of exploring the sources of the Niger, when he died, and as a sheikh was interred in the Moslem burial ground. He bequeathed his collection of 500 volumes of oriental MSS. to the library of the university of Cambridge. His works include narratives of his travels in Nubia (London, 1819), in Syria and the Holy Land (1822), in Arabia (1829), "Manners and Customs of the Modern Egyptians" (1830), "Notes on the Bedouins and Wahabys" (1830), and "Arabian Proverbs" (1831).

BURDACH, Karl Friedrich, a German physiologist, born at Leipsic, June 12, 1776, died July 16, 1847. He graduated in medicine at Leipsic in 1800, and in 1811 became professor of physiology in the university of Dorpat. Three years later he was transferred to the corresponding chair in the university of Königsberg. Here he passed the greater part of his life, and performed most of his scientific labor, although he was subsequently attached to the university of Breslau. His writings give evidence of much research and originality, though wanting in simplicity. The most important are: *Handbuch der neuesten Entdeckungen in der Heilmittellehre* (Leipsic, 1805); *Beiträge zur näheren Kenntniss des Gehirns, in Hinsicht auf Physiologie* (2 vols., 1806); *System der Arzneimittellehre* (4 vols., 1807-'9; 2d ed., 1817-'19); *Handbuch der Pathologie* (1808); *Die Literatur der Heilwissenschaft* (3 vols., Gotha, 1810-'21); *Vom Baue und Leben des Gehirns und Rückenmarks* (3 vols., Leipsic, 1819-'25); *Die Physiologie als Erfahrungswissenschaft* (6 vols., 1826-'40), translated into French by Jourdan (Paris, 1837-'40); *Umrisse einer Physiologie des Nervensystems* (1844).

BURDEKIN, a river on the N. E. coast of Australia, in the N. part of the colony of Queensland. It flows S. E. about 280 m., then E., and again E., to Upstart bay; total length about 350 m. It was first discovered by Leichardt, and in 1859 investigated more fully by Dalrymple.

BURDEN, Henry, an American inventor, born at Dumblane, Scotland, April 20, 1791, died in Troy, N. Y., Jan. 19, 1871. He was the son of a farmer, studied mathematics, engineering, and drawing at Edinburgh, and settled in the United States in 1819. He soon made an improved plough, and in 1820 invented the first cultivator used in the United States. He obtained patents for making wrought spikes in

1825, for horse shoes in 1835, for the hook-headed spike which is used on American railroads in 1840, and for a self-acting machine for reducing puddlers' balls into blooms in 1840, and into bars in 1849. His greatest achievement was his machine for making horse shoes, which was patented in the United States in 1857, and in the principal European countries. It produces from the iron bars 60 shoes per minute. He also invented a suspension water wheel. In 1838 he built a steamboat 300 ft. long, with paddle wheels 30 ft. in diameter; from its shape it was called the "cigar boat." It was lost through the mismanagement of the pilot. Long before Mr. Brunel, he proposed the construction of gigantic ocean steamers.

BURDER, George, an English clergyman, one of the founders of the London missionary society, born in London, June 5, 1752, died there, May 29, 1832. He left the study of the fine arts for that of divinity, was pastor of the Independent church at Lancaster from 1778 to 1783, afterward at Coventry till 1803, and subsequently of the church in Fetter lane, London. He was secretary of the London missionary society, and editor of its organ, the "Evangelical Magazine." His "Village Sermons" (6 vols., 1799-1812) were translated into many foreign languages. He also published volumes of "Cottage Sermons," "Sea Sermons," and "Sermons to the Aged," which were very widely circulated; and edited the "Pilgrim's Progress" and Henry's "Commentaries upon the Bible."

BURDETT, Sir Francis, an English politician, born Jan. 25, 1770, died Jan. 23, 1844. After completing his education at Oxford he passed some years on the continent. His residence in Paris during the early part of the French revolution, and his study of French politics, led to his adoption of principles of more radical reform than had been prominently advanced in England at that day, and on his return home in 1793 he was strongly encouraged in his opinions by his friend John Horne Tooke. He married, Aug. 5, 1793, Sophia, youngest daughter of Thomas Coutts, a London banker. In 1796 he was elected a member of parliament for Boroughbridge, largely through the influence of the duke of Newcastle. In 1797 he succeeded to the baronet's title of his grandfather, his father and elder brothers having died within a few years. In parliament he distinguished himself by advocacy of the most radical measures, and assailed the government as inimical to the people. He became especially prominent through the investigations suggested by him into the management of Cold Bath Fields and other prisons. In 1802 he again became a candidate, this time for Middlesex, and was opposed by Mr. Mainwaring, his bitterest opponent in the house. The contest was one of the greatest excitement, and the first election, giving Sir Francis the victory, was declared irregular and void. A new election in 1804, at which Mr. Mainwaring's son

took the place of his father, was decided for Burdett by a majority of five, but was also declared void; and finally a committee determined that Mainwaring was chosen by a majority of one vote. He again lost his election in 1806. In 1807 he fought a duel with Mr. James Paull, whom he had formerly supported, but with whom he had had political differences. Both duellists were severely wounded, and while recovering both were nominated for parliament by the opposing parties of Westminster; Sir Francis was elected by a large majority, and for nearly 30 years retained this seat. In 1810 he published in Cobbett's "Political Register" a letter denying the power of the commons to imprison delinquents. The house voted this to be "libellous and scandalous," and ordered his arrest. He barricaded his house, and was only taken after a resistance of four days. His commitment to the tower excited a serious riot, in which several persons were killed by the soldiers. He was released in June, on the prorogation of parliament. In succeeding sessions he continued his advocacy of popular measures, opposed the suspension of the *habeas corpus* act, supported Catholic emancipation, and protested against taxation without full representation. In 1820 he was sentenced to three months' imprisonment and a fine of £1,000 for a letter on the "Manchester Massacre." He continually supported the views of the popular party until about 1835-'6, when he deserted the cause of the Melbourne ministry on account of their bearing toward O'Connell, whose agitation he opposed. He was by this step compelled to resign his Westminster seat, but he was nevertheless again returned. In 1837, however, he refused to be again a candidate in that borough, and was elected for Wiltshire, and continued to represent that county till his death.

BURDETT-COUTTS, Angela Georgina, baroness, an English philanthropist, youngest daughter of Sir Francis Burdett, born in April, 1814. The fortune of her grandfather, Mr. Thomas Coutts, the banker, was left to his widow, the actress Mrs. Mellon, whom he married late in life, and was diverted into another channel by the marriage of the latter with the duke of St. Albans. The duchess, however, having no children, made Miss Angela Burdett her heiress, on condition that she should assume the name of Coutts. In 1837 Miss Burdett-Coutts succeeded to this property, estimated at between two and three millions sterling, and since that time her income has been devoted to charities. Among these are the erection of a church with a parsonage and schools in a neglected part of London; the erection of a church at Carlisle; the endowment of missionary dioceses in South Australia, South Africa, and British Columbia; and the supply of funds for a survey of Jerusalem, with a view to render that city healthy by a supply of pure water. She secured valuable Greek manuscripts from the East for the verifi-

cation of Scripture, and gave food and clothing and a vessel to the starving people of the island of Girvan. She was raised to the peerage in June, 1871. A valuable testimonial and the franchise were presented to her in 1872 by the corporation of the city of London.

BURDWAN, a city of Hindostan, capital of a British district of the same name in the presidency of Bengal, situated on the left bank of the Dummodah, and on the Grand Trunk railway, 58 m. N. W. of Calcutta; pop. about 55,000. It consists mainly of a crowded assemblage of wretched mud houses, with few handsome buildings. The residence of the titular rajah is a collection of various-colored houses surrounded by gardens, and remarkable for size and want of symmetry. The town contains English government and military schools, the residences of European civil functionaries, and factories of silk and cotton. In the vicinity are indigo works, and an artificial pool surrounded by an ornamented portico, much resorted to by bathers.

BUREAU, a N. W. county of Illinois, bounded S. E. by Illinois river, which is here navigable by steamboats; area, 800 sq. m.; pop. in 1870, 32,415. The surface is but little elevated, and the soil is generally fertile. Timber is scarce. The Chicago and Rock Island railroad and its Peoria branch, and the Chicago, Burlington, and Quincy and its Buda and Rushville branch, intersect the county. The chief productions in 1870 were 465,960 bushels of wheat, 43,811 of rye, 3,080,404 of Indian corn, 987,426 of oats, 98,732 of barley, 284,580 of potatoes, 62,099 tons of hay, 580,287 lbs. of butter, and 45,533 of wool. There were 19,193 horses, 13,590 milch cows, 28,999 other cattle, 9,679 sheep, and 50,674 swine. Capital, Princeton.

BURG. I. A town of Prussia, in the province of Saxony, on the Ihle, 13 m. N. E. of Magdeburg; pop. in 1871, 15,184, partly descendants of Palatinate, French, and Walloon settlers. The service of one of the four churches is performed in French. The Protestant refugees contributed much toward the ancient cloth manufactures, which now give employment to about 10,000 persons. Until the close of the 17th century Burg formed part of the principality of Querfurt, and afterward it became part of Brandenburg and Prussia. **II.** A town of Prussia, in the district of Düsseldorf, on the Wupper, 7 m. S. of Elberfeld; pop. about 2,000. It has important manufactures, especially of hardware and of ribbons.

BURG, Johann Tobias, a German astronomer, born in Vienna, Dec. 24, 1766, died at Wiesenau, near Klagenfurt, Nov. 25, 1834. He was for three years assistant in the observatory at Vienna, and afterward professor at Klagenfurt. In 1798 the French institute proposed an astronomical question, and required that its solution should be based upon at least 500 observations. Papers of great merit were presented by Bürg and by Alexis Bouvard, and the judges were at a loss between claims so

nearly equal. The difficulty was settled by Napoleon, who contributed 3,000 francs for a second prize. Bürg's most important publications relate to lunar motions.

BURGDORF (Fr. *Berthoud*), a town of Switzerland, on the Emmen, in the canton and 11 m. N. E. of Bern; pop. in 1870, 5,078. It was formerly the capital of Little Burgundy, the castle being then of great strength. In the vicinity are the baths of Sommerhaus. From 1798 to 1804 Pestalozzi resided in the château of Burgdorf, which he converted into a school.

BÜRGER, Gottfried August, a German poet, born at Molmerswende, Dec. 31, 1747, died in Göttingen, June 8, 1794. A comic poem of his composition drove him from the school of Aschersleben, and his dislike of theology from the university of Halle. In 1768 he went to Göttingen, where he studied the languages and poetry of foreign nations, and Shakespeare became one of his idols. An insignificant public office in a village near Göttingen gave him a small income. He associated with the poets who founded the *Hainbund*, and while at the village of Gelliehausen composed the ballad *Lenore*, published in the *Göttinger Musenalmanach* für 1774. This made him famous, but left him poor. Losing his office in 1784, he worked hard to support himself by teaching and translations, and by other literary work. In 1787 he began to lecture on Kantian philosophy and aesthetics in Göttingen, and was made doctor of philosophy, and in 1789 honorary professor. He had married in 1775 Dorette Leonhart, who bore him a child, but he lived at the same time, with the wife's cognizance, with her youngest sister Auguste, or Molly, as he called her in his poems, who bore him two children. Dorette died in 1784; he then legalized his union with Molly, who died in 1786. In 1790 he married Christine Elise Lahn of Stuttgart, the Swabian girl (*Schwabenmädchen*), as he designated her, who had offered him her hand without having ever seen him. But she deserted him, and they were divorced in February, 1792. Bowed down by misfortune, and already suffering from consumption, Schiller's unfavorable review of his poems in the *Allgemeine Literaturzeitung* was an additional blow which hastened his death. *Lenore*, *Das Lied vom braven Manne*, *Der wilde Jäger*, and *Des Pfarrers Tochter von Taubenhain* are among his most stirring ballads; and these as well as many of his other compositions give him a high rank among poets. His ballads have been translated into many languages, *Lenore* into English by Sir Walter Scott. He contributed much to the improvement of the German language, and wrote on aesthetics and various other subjects. He was the first to give German versions in hexameter from the *Iliad* and the *Æneid*, and translated "Macbeth" into German. His literary activity was prodigious. His complete works were first published by Reinhard (4 vols., Göttingen, 1796-'8), who also published Bürger's *Lehr-*

buch der Aesthetik (2 vols., Berlin, 1825), after his lectures at Göttingen, and a supplementary volume, *Aesthetische Schriften* (1832). Doubt was, however, expressed as to the genuineness of these posthumous publications. The collected edition by Bohtz, in one volume (Göttingen, 1884), contains Bürger's correspondence and the excellent biography of him by Althof, first published in 1798. Among his other biographers are Döring, and more recently Pröhle (Leipzig, 1856). Various works have been published upon his conjugal relations, and his *Briefe an Marianne Ehrmann*, published in 1802 by Theodor F. Ehrmann, give curious details in respect to the latter part of his life. His third wife died in 1833, having been an actress, and written poems, a drama, and a novel.

BURGESS, Tristram, an American statesman, born in Rochester, Mass., Feb. 26, 1770, died in Providence, R. I., Oct. 18, 1858. He graduated at Rhode Island college (now Brown university), Providence, in 1796, studied law, and became a leader of the Rhode Island bar. In 1815 he was made chief justice of the state, but went out of office in 1816 with the defeat of the federalists, and became professor of oratory and belles-lettres in Brown university. He was a representative in congress from Rhode Island from 1825 to 1835. A speech on the judiciary soon made him prominent. He submitted a bill proposing a system of pensions for the surviving soldiers of the revolution, and made many brilliant speeches in support of a protective tariff. He used sarcasm with great effect in debate, especially in his famous dispute with John Randolph. Though generally opposed to President Jackson, he fully sustained his course in respect to nullification. His vehement opposition to Mr. Clay's compromise tariff bill contributed to his losing his seat in congress in 1835, after which he retired from public life. He published a number of his speeches, and in 1839 appeared his "Battle of Lake Erie, with Notices of Commodore Elliott's Conduct." A memoir of him, with selections from his speeches and writings, was published by Henry L. Bowen in 1835, and another memoir appeared in 1869.

BURGESS, George, D. D., an American bishop, born in Providence, R. I., Oct. 31, 1809, died at sea, April 23, 1866. He graduated at Brown university, where he became tutor, and afterward studied two years at Göttingen, Bonn, and Berlin. He was rector of Christ church (Episcopal), Hartford, from 1834 to October, 1847, when he was consecrated bishop of the diocese of Maine, becoming also rector of Christ church at Gardiner. He was a leader of the moderate church party. Toward the close of his life he established an Episcopal mission in Hayti, and died of paralysis while he was on his way to Port-au-Prince. His writings include a metrical version of a portion of the Psalms (1840), "The Last Enemy Conquered and Conquering" (1851), and "Sermons on the Christian Life" (1854).

BURGESS, Thomas, an English bishop, born at Odiham, Hampshire, Nov. 18, 1756, died at Salisbury, Feb. 19, 1837. He was the son of a grocer, studied at Winchester, obtained a scholarship at Oxford, and became a fellow and tutor of his college. Mr. Addington, the prime minister, who had been his fellow student at Winchester and Oxford, appointed him bishop of St. Davids in 1803, and in 1825 he was translated to the see of Salisbury. He aided in founding the royal society of literature, of which he was president from 1821 to 1832. His biographer, J. S. Harford, enumerates nearly 100 publications, theological, classical, and miscellaneous, issued by him; among these are editions of Burton's *Pentalogia* (2 vols., 1780), and Dawes's *Miscellanea Critica* (1781). In his "Considerations on the Abolition of Slavery" (1789), he recommended gradual emancipation.

BURGH, James, a Scottish writer, born at Madderty, Perthshire, in 1714, died at Islington, London, Aug. 26, 1775. He was a cousin of the historian Robertson. He prepared himself for the church at the university of St. Andrews, but engaged in the linen trade, in which he was unsuccessful. He then became a proof-reader in London, and in 1746 a teacher at Marlow and afterward at Enfield, and was principal of an academy at Newington from 1747 to 1769; when ill health compelled him to retire to London. His "Britain's Remembrancer" passed through many editions; and having been published anonymously, it was ascribed to eminent churchmen. Among his other writings are: "The Dignity of Human Nature," his principal work (1754); "Essay on the Art of Speaking" (1762); "Crito" (2 vols., 1766-'7); and "Political Disquisitions" (8 vols., 1774-'5).

BURGHLEY, Lord. See BURLEIGH.

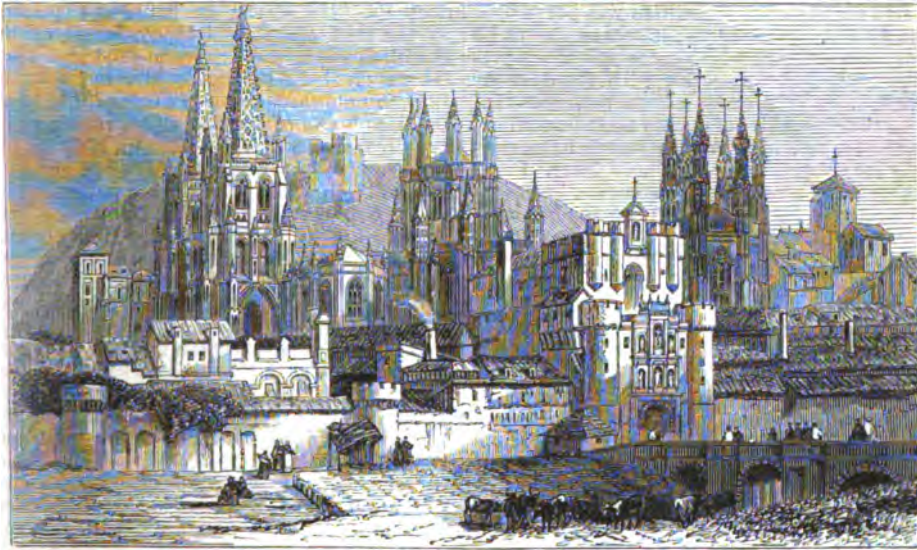
BURGLARY (law Lat. *burgi latro*, a robber of a burg or enclosure), the crime of breaking and entering in the night time the dwelling house of another, with intent to commit some felony therein. To constitute burglary it is held: 1. That the house broken into must be a place of actual residence; yet, if it is habitually occupied, the fact that no one was in the house at the time of breaking into it will make no difference in the character of the offence. An outhouse, if immediately connected with the dwelling, is deemed a part thereof, so as to make the offence of entering it the same; and this rule has been extended to barns, stables, &c., though they are not under the same roof with the dwelling house, or contiguous, provided they are in a common enclosure, called curtilage. So also a room in a private house which the lodger occupies as his own, independent of the control of the proprietor of the house, or a room in a college or inns of court, is in law deemed the mansion of the occupant, and the breaking into it is the same as the breaking through an outer door. But in a hotel or boarding house, where the apartments

are under the management of the proprietor of the house, and there is a common entrance to them, the whole constitute but one mansion. Burglary may be committed in a church, because, as explained by Lord Coke, it is *domus mansionalis Dei*. 2. The breaking may be either actual or constructive. It is actual when any impediment to an entry is overcome or removed, as where a door is opened, a window raised or broken, or a screen cut away from an open window, or any fastening to either broken or removed, or the like. It is constructive when an entry is gained by fraud, conspiracy, or threats. The breaking of an inner door, where an entrance has been obtained through an open door or window, will be sufficient; and so would be knocking at a door and upon its being opened rushing in with felonious intent. 3. The entry may be of the whole body or any part thereof, as the hand or foot; but the introduction of an instrument or weapon for the purpose of the contemplated felony, and not for the purpose of the breaking merely, will be sufficient; as if a sword be reached through a raised window to stab a person sleeping inside. 4. It must be in the night, not by day. The peculiar criminality of the offence is the supposed danger to life. The English rule is, that if there is daylight enough to distinguish a man's face, the entering of a house will not be burglary. This does not include moonlight, for the offence is not so much that it is done in the dark as at an hour when the inmates of the house would be unguarded. 5. The intent must be to commit a felony; if it be to commit a trespass only, or a misdemeanor, it will be no burglary. But if the felonious intent exist, it will be immaterial to this crime whether the felony was actually committed or not. 6. By the English statute 24 and 25 Victoria, c. 96, it is provided that whoever shall enter the dwelling "house of another with intent to commit any felony therein, or being in such dwelling house shall commit any felony therein, and shall in either case break out of the said dwelling house in the night, shall be deemed guilty of burglary." This disposes of a question which had been raised at the common law, whether such breaking out was burglary. The punishment of the offence in England was formerly death; now it is penal servitude for life, or for a term of years not less than five, or imprisonment not more than two years, with or without hard labor, and with or without solitary confinement.—In the United States burglary is a felony, punishable with imprisonment as prescribed by state statutes. In addition to the common law offence, there are also statutory burglaries, differing in one or more particulars.—The Scotch *hamesucken*, sometimes confounded with burglary, differs from it in being an assault upon a person in his own house, either in the night or day time.

BURGOS. 1. A province of Spain, in the north and centre of Old Castile; area, 5,650 sq. m.

pop. in 1867, 357,846. It is traversed by ranges of the Pyrenees and the Iberian mountains, the principal chain being the sierra de Oca. The Ebro in the north, the Arlanzon in the centre, and the Douro in the south are the principal rivers. The climate is cool and variable, the short springs being often succeeded by scorching heat. Minerals abound, but are neglected. Timber is abundant, and there are valuable fisheries. Linen, woollen, and cotton goods and other articles are manufactured. The trade is chiefly inland. Education is making progress, and crime is rare. Among the towns are Aranda, Lerma, and Miranda. II. A city, capital of the province, 130 m. N. of Madrid; pop. in 1867, including the suburbs, about 27,000. It is situated in a fertile plain nearly 2,900 feet above the sea, and built in the form of an amphitheatre around a hill, on the right

bank of the Arlanzon, an affluent of the Pisuerga; the river partly divides the city from the suburbs La Vega, Las Huelgas, and San Pedro. The principal promenade is the Espolon, adorned by many statues of kings; the Cubos and Isla promenades are on the banks of the river. On the summit of the hill, occupying the site of the old castle, is the citadel, with new fortifications. In the calle Alta is an arch erected in honor of Fernando Gonzales. The site of the house in which the Cid lived is marked by a pillar and two obelisks, though the house itself was removed in 1771. The bones of the Cid were transferred in 1842 from the neighboring convent of San Pedro de Cardina to the town hall of Burgos. The Gothic cathedral of Burgos is among the most renowned in Europe for its architecture and works of art. Its 14 chapels contain many fine sepulchral



Entrance to Burgos.

monuments and paintings. Behind the cathedral is the church of Santa Aguida or Gardea, where the Cid compelled Alfonso VI. to swear that he had no part in the assassination of his brother Sancho. The finest church after the cathedral is San Esteban. The church of San Ildefonso is now used as a depot of artillery, San Juan Bautista as a prison, San Pablo as barracks, and other old churches have been appropriated to other purposes, or pulled down. There are many convents, hospitals, charitable institutions, colleges, schools, and a royal gymnasium; but the once famous university has long ceased to exist. The situation of Burgos on the high road from Madrid to Paris favors trade, which is especially active in wool and woollen fabrics; an annual fair is held in June. The manufactures include woollens, linens, hats, and leather. The surround-

ing region is fertile in cereals, flax, hemp, vegetables, and fruits. Burgos is the seat of a cardinal archbishop, of a captain general, and of several courts of justice and a chamber of commerce. Near the city is the Carthusian convent of Miraflores, a famous Gothic building, containing the tombs of John II. and his queen Isabella, and the nunnery of Santa Maria del Real, popularly called Las Huelgas, on account of its being situated on pleasure grounds (*huelgas*) which belonged to Alfonso VIII.—Burgos was founded late in the 9th century by Diego de Porcelos, who built a castle as a protection against the Moors. It afterward rose to great importance, with a population variously estimated at 40,000, 50,000, and even 80,000, and became the capital of Castile. It declined after the beginning of the 16th century, when Charles V. made Madrid the me-

ropolis of Spain. Soult nearly annihilated the Spanish army at Burgos, Nov. 10, 1808; and in 1813 the fortress was captured by Wellington, after having withstood four assaults in 1812.

BURGOYNE. I. John, an English general, born about 1730, died in London, August 4, 1792. He has been commonly represented as a natural son of Lord Bingley, but in Burke's "Peerage" he is mentioned as the grandson of Sir John Burgoyne of Sutton Park, Bedfordshire. While a subaltern in the army he married clandestinely a daughter of the earl of Derby. The earl settled £800 a year upon him, and used his influence for his promotion. In 1762 he served with distinction as brigadier general in Portugal. He was elected to parliament in 1761 for the borough of Midhurst. In 1768 he contested the borough of Preston at an expense of £10,000, and for excesses which it is said his partisans committed was prosecuted and fined £1,000. In the letters of Junius he was severely dealt with, on account of his presumed political connection with the duke of Grafton. In 1772, on his motion, parliament appointed a committee of inquiry on Indian affairs, and in the following year he moved unsuccessfully for a vote of censure on Lord Clive. Being appointed to a command in America, he reached Boston in May, 1775, and saw the battle of Bunker Hill, of which he wrote a graphic account to Lord Stanley. He returned home in December, 1776, was appointed lieutenant general, and placed in command of the British army in Canada, where he arrived early in 1777. Having invited the Indians to join him, he captured Ticonderoga, July 6, but was defeated at Stillwater, N. Y., Sept. 19, and at Freeman's farm, Oct. 7, and was compelled to surrender at Saratoga, Oct. 17, to the American army under Gates and Arnold. This surrender excited great indignation in England, and on his arrival in London the king refused to see him. A court martial which he demanded was refused, on the ground that a prisoner on parole could not be tried. He published a narrative which removed some of the prejudices against him, and vindicated himself in parliament, throwing the blame of his disaster upon the American secretary. He joined the opposition, and an ineffectual attempt was made to exclude him from parliament on account of his being a prisoner of war. He then resigned all his appointments; but in 1782 he was restored to his rank in the army, and appointed privy councillor and commander-in-chief in Ireland. In 1784 he retired from public life. He wrote in 1780 a comic opera, "The Lord of the Manor," borrowed from the French, in 1786 a comedy, "The Heiress," which is still occasionally performed, and several other dramatic works. His plays and poems were collected and published in 2 volumes, in 1808. He died without legal issue. **II. Sir John Fox**, a British general, a natural son of the preceding, born in 1782,

died in London, Oct. 7, 1871. He entered the army in August, 1798, as second lieutenant of engineers; served at Malta, in Egypt, in Sicily, and in Sweden, from 1800 to 1807; was with Sir John Moore in the peninsula in 1808, under Wellington from 1809 to 1814, and was present at the principal battles and sieges, conducted the sieges of Burgos and San Sebastian, and was twice wounded. In 1814-15 he was engineer-in-chief of the attack on New Orleans, and in 1826 was sent to Portugal in the same capacity. In 1830 he was made colonel and appointed chairman of the board of public works in Ireland; major general in 1838; and was inspector general of fortifications of England from 1845 to 1858. The famous letter of the duke of Wellington, showing how ill prepared England was for war and against invasion, was addressed in 1847 to Burgoyne, then inspector general of fortifications. He served as lieutenant general on the staff and second in command of the British forces in the Crimea in 1854 and 1855. He was created a baronet in March, 1856. In 1859 he published, under the title of "Military Opinions," one of the best essays relating to a French invasion of England. In 1865 he became constable of the tower of London and field marshal. His "Life and Correspondence," by Lieut. Col. the Hon. George Wrottesley, was published in 1873 (2 vols. 8vo).—His only son, **HUGH TALBOT BURGOYNE**, a captain in the navy, commanded the *Wrangler* at the capture of Kinburn in 1855, and in 1857 received marks of distinction from Queen Victoria and Napoleon III. He was lost at sea while in command of the turret ship *Captain*, which foundered off Cape Finisterre, Sept. 7, 1870.

BURGSCHMIET, Jakob Daniel, a German sculptor and bronze founder, born in Nuremberg in 1796, died March 7, 1858. He established in 1819 a manufactory of mechanical toys, and subsequently studied his art in his native town and in Paris. Among his notable productions are statues of Melanchthon, Albert Dürer (both in Nuremberg), Beethoven (in Bonn), the emperor Charles IV. (in Prague), and Luther (in Möhra). He died while at work upon the colossal monument of Radetzky at Prague, which has since been completed by his son-in-law Lenz, who took charge of his studio.

BURGUNDIANS, or *Burgundii*, the name of a primitive German race, a branch of the Goths, whose original territory lay between the Oder and the Vistula, from which they were driven out by the Gepidæ. They settled between the Main and Neckar, and in A. D. 407, joining the Suevi, Alani, and Vandals, crossed the Rhine under the command of Gundicar, penetrated into Gaul, settling between the Alps, the Saône, and the Rhône, and established the Burgundian realm, of which Geneva, and subsequently Lyons, was the capital. This lasted till 534, when King Gundemar fell in battle against the Franks, who took possession of Burgundy. Gundicar fell in 436, fighting

against the Huns, and was succeeded by his son Gunderic, who was the ally of the Romans in their struggle with Attila. One of his successors, Gundebald, was the author of the *Lex Gundobada*. Soon after their arrival in Gaul the Burgundians became Arian Christians, but Sigismund, the son and successor of Gundebald, embraced Catholicism.

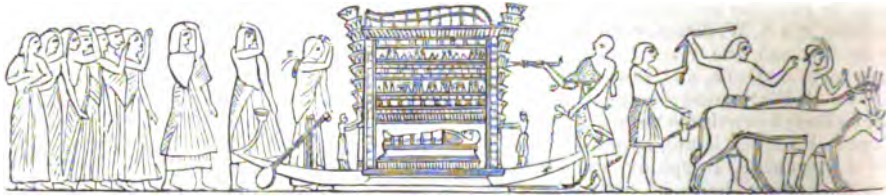
BURGUNDY (Fr. *Bourgogne*), the name of three kingdoms, of a feudal duchy, and lastly of a French province. **I. First Kingdom of.** This was founded about 413 by the Burgundians, who gradually extended their dominions over the valleys of the Saône and the Rhône, their possessions being bounded N. by the Rhine, the Faucilles mountains, and a winding line falling in a S. W. direction to the Loire, E. by the Alps and the river Reuss, W. by the upper Loire, Ardèche, and lower Rhône, and S. by the Mediterranean; consequently including the French provinces known afterward as Burgundy, Franche-Comté, Lyonnais, the N. E. part of Languedoc, Dauphiny, and Provence, with the western parts of Switzerland and Savoy. About the year 500 Clovis, impelled by his wife Clotilda, a Burgundian princess, desirous of avenging her father's death, invaded Burgundy, and imposed a heavy tribute, and the sons of Clovis conquered the kingdom, which in 534 became part of the Frankish empire. It however preserved its name and local laws, and more than once had Merovingian kings of its own. **II. Cisjurane and Transjurane.** The Frankish dominion over Burgundy had lasted 300 years when the dismemberment of the Carolingian empire occurred, and Burgundy was among the first to assert its independence. In 879 a number of bishops and noblemen conferred the crown upon Boso, count of Vienne, a mild and prudent prince, brother-in-law of Charles the Bald of France. His kingdom, from its situation in respect to France, was called Cisjurane, and sometimes Lower Burgundy, consisting of southwestern Franche-Comté, southern Savoy, Dauphiny, and Provence, with a part of Lyonnais. A little later, Count Rudolph of Upper Burgundy founded a second kingdom of Burgundy, the Transjurane, formed of western Switzerland to the Reuss, northeastern Franche-Comté, and northern Savoy. The two kingdoms were united in 930, but not integrally, under the name of the kingdom of Arles, which continued for about a century. Meanwhile the kings of Arles or Provence, unable to contend successfully against the nobles, were obliged to acknowledge the supremacy of the German emperors. Consequently, on the death of Rudolph III., in 1032, the emperor Conrad II., as lord paramount, took possession of the kingdom, so that the S. E. part of France became one of the provinces of the German empire. It was now governed by imperial vicars; but early in the 14th century the various provinces of which it consisted separated; some, like the Swiss cantons, asserting their independence,

others acknowledging the power of their own feudal lords, but most of them reverting to the French kings. **III. Duchy of.—First Ducal House.** While these kingdoms were passing through these vicissitudes, the N. W. part of old Burgundy had remained united to France, and formed one of its great feudal provinces. In the 10th century the duchy of Burgundy belonged to Henry, brother of Hugh Capet, and shortly afterward to the second son of Robert the Pious. This prince, who died in 1075, was the head of the first ducal house of Burgundy, which lasted till 1361. His successors, 11 in number, were among the 12 peers of France, and rivalled the most powerful princes of their times. They increased their hereditary dominions, especially by the annexation of the county of Burgundy or Franche-Comté, one of the provinces dismembered from the kingdom of Arles, and were besides during the 13th and 14th centuries possessors of a kingdom and two principalities in the East. They proved singularly constant in their loyalty to the kings of France. Several of them engaged in crusades, especially Hugh III. and his grandson Hugh IV. The latter accompanied Louis IX. in his expedition to Egypt, shared his captivity, and was liberated with him. By a treaty with Baldwin II., emperor of Constantinople, he became king of Salonica. Eudes IV., the last but one of the family, besides that kingdom, had also the principalities of Achaia and Morea.—**Second Ducal House.** On the death of Philip the Rouse, the last of the preceding family, the duchy of Burgundy reverted for a short time to the crown of France. King John, to reward his third son, Philip the Bold, who had fought gallantly at Poitiers, bestowed this rich inheritance upon him, Sept. 6, 1363. He and his three successors were among the most famous historical characters of their age. (See PHILIP THE BOLD, JOHN THE FEARLESS, PHILIP THE GOOD, and CHARLES THE BOLD.) The last two dukes possessed regal power, and their dominions included not only Burgundy proper and several adjoining French fiefs, but the whole of the Netherlands, and finally the duchy of Lorraine and the imperial vicariate of Alsace. On the death of Charles the Bold in battle against René II. of Lorraine, whom he had dispossessed, Louis XI. at once seized on the duchy of Burgundy, Franche-Comté, Picardy, and Artois, as escheated French fiefs; he was, however, obliged to resign Franche-Comté, but retained the other provinces. Mary, the heiress of Charles, married Maximilian of Austria, whence the claims of Austria to the Burgundian provinces. The Low Countries and Franche-Comté were, however, all that it ever possessed. But these contests were the origin of protracted wars between France and Austria. **IV. Province of.** The duchy proper, from its reunion to France in 1477, became one of the most important provinces of the kingdom. It was, moreover, one of the most loyal. When Francis I. by the treaty of Madrid agreed to restore

to Charles V. all the provinces once belonging to the ducal house of Burgundy, the states of the province solemnly protested that they were French, and that the king had no right to give up his subjects against their consent. This province now forms most of the departments of Yonne, Côte d'Or, Saône-et-Loire, Ain, and a small part of those of Aube and Nièvre. It is celebrated for its industry, but above all for its wines. The Charolais and Côte d'Or ranges traverse it from S. to N., extending toward the plateau of Langres, and forming the watershed between the tributaries of the Rhône and those of the Seine and Loire. The Seine, which rises

in the province, flows through the northwest, the Saône traverses the centre, and the Rhône and Ain water the southeast. The canal du Centre connects the Saône with the Loire. Adjoining it are the rich mines of Le Creusot. Among the towns are Dijon, Mâcon, Autun, Châlon-sur-Saône, and Bourg.

BURGUNDY WINES. See FRANCE, WINES OF. **BURIAL.** Three principal methods have been employed at different times and in different countries for the disposition of the dead: mummification, incineration, and interment. Mummification was practised by the Egyptians from the most remote period to the 6th century of



Ancient Egyptian Funeral Procession.

the Christian era. They embalmed not only human corpses, but the bodies of the ibis, hawk, monkey, cat, and other animals which were held sacred. This preservation of the remains of the dead through a series of ages gave rise to an enormous multiplication of mummies.—The Hebrews buried their dead, though, from some Scriptural passages, it

would seem that incineration was likewise practised. The cemeteries were invariably situated without the walls of the cities. The mourning ceremonies generally lasted seven days, and in the case of very eminent personages thirty days, during which period the nearest mourners fasted and imposed upon themselves other sacrifices.—Among the Greeks, in historical times, the bodies of the dead were interred or burned, and a common word (*θάρσις*) is used for either burial or burning. When the body was not burn-



Greek Funeral Urn.

ed, it was placed in a coffin, generally made of baked clay or earthenware, and buried without the town; intramural interment being forbidden, from the belief that the presence of the dead brought pollution to the living. If burned, the body was placed upon a pyre built of wood, to which fire was communicated in the presence of those who had attended the funeral; when the flames were extinguished, the bones were collected and placed

in urns made of various materials. These were preserved in tombs usually built on the roadsides without the city gates. The burial of the dead by the nearest relatives was a sacred duty, and its neglect exposed them to grave accusations. After the funeral the family of the deceased partook of a feast at the house of the nearest kinsman; and at Athens the period of mourning continued 30 days, during which other sacrifices and feasts were celebrated. In the representation of these ceremonies on monuments, a horse's head is usually found in one corner, intended to represent death as a journey. The punishment of certain criminals was aggravated by the denial of funeral rites, and there were places both at Athens and Sparta into which the bodies of such criminals were cast.—In the olden times of the republic the Romans generally buried their dead, though burning was likewise practised. Sulla appears to have been the first of the Cornelian gens who was burned. Under the empire burning became customary, until it was subverted by the gradual spread of Christianity, and at the end of the 4th century it had again fallen into general disuse. The funeral rites varied according to the wealth of the deceased. In the



Roman Funeral Urn.

latter days of the republic and under the earlier emperors, the remains of the rich were washed, anointed with oil, and perfumed by the slaves of the undertakers, who, from residing near the temple of Venus Libitina, where funeral articles were sold, were called *Libitinarii*. A coin was placed in the mouth of the corpse to pay its ferriage into Hades, and the body, dressed as well as possible, was placed with its feet toward the door in the vestibule of the house. If the deceased had received an honorary crown, it was placed upon the head, the couch was often adorned with flowers, and a branch of cypress placed before the door. The funeral took place at night. The procession, headed by musicians, was attended by hired mourners, who sang the funeral song; next came the freedmen of the deceased, wearing the cap of liberty. Immediately preceding the corpse persons with waxen masks represented the ancestry of the deceased.



Columbaria in the Applan Way.

ed; the corpse itself, placed upon the couch, was generally borne by the freedmen or by the nearest of kin; the family followed after, the men with their heads covered, the women uncovered and with dishevelled hair, beating their breasts and uttering piercing cries. If warranted by the rank of the deceased, the procession passed through the forum, and an oration was there pronounced. Finally, the corpse, with the couch upon which it was borne, was placed upon the funeral pyre, built commonly in the form of an altar, with four equal sides. The nearest relative, with averted face, kindled the pyre, and perfumes, oils, articles of food, ornaments, and clothing were frequently thrown on while it was being consumed. The embers were extinguished with wine, and the bones and ashes carefully collected by the nearest of kin, sprinkled with perfumes, and placed in an urn. These urns (*olla*) were of various forms and materials, and

when sealed they were deposited in pairs in niches made in the perpendicular walls of chambers or enclosed places constructed for the purpose, or sometimes by the roadside, and called *columbaria*, from the resemblance of their arrangement to a dovecote. The ashes of the lower classes and of dependants were deposited with less care in sepulchral chambers, each of which was also called a *columbarium*, the plural being invariably used in speaking of the niches. The mourning and sacrifices were continued for nine days, and by the women mourning was sometimes worn for a year on the death of a husband or father.—The early Christian martyrs were buried in churches, and afterward distinguished persons shared this privilege, which eventually was extended indiscriminately, either within or near churches, and to such an extent as to produce deleterious effects. This practice was abolished in France early in 1777, and has been generally discontinued elsewhere. In London, in some of the poorer districts, the soil of the churchyards was raised two, three, or even four feet in a few years, and not only was the atmosphere of the neighborhood rendered most unhealthy, but accidents occurred from the carbonic acid gas given off during decomposition breaking into cellars near the cemeteries.—The *suttee* or voluntary immolation of a widow, by burning or burying alive in connection with the body of her husband, formerly prevalent in India, is now of rare occurrence. Many savage tribes in various parts of the world suspend their dead from trees, or place them upon elevated platforms. The latter cus-



Aboriginal Burial.

tom was practised by many of the North American Indians. Among the Turks and other eastern nations, the dead are treated with reverence, and buried in cemeteries which are carefully kept. Among the modern Greeks the faces of the dead are usually uncovered while

they are borne to the burial ground. The orthodox Jews retain several of the mourning ceremonies of their ancestors. Among the lower classes of the Irish the funeral ceremonies frequently begin with a "wake," of which copious stimulants form an important part, and the mourning often degenerates into orgies. In the burial grounds of England, France, and other European countries, it is customary for friends to strew flowers upon the graves at frequent intervals. In the United States burial grounds are usually outside of the limits of towns and villages, though churchyards are still frequently used in small places; and the funeral ceremonies, varying somewhat among different denominations, are similar to those of Europe. Beautiful cemeteries have been established in the neighborhood of the principal cities, and upon the sites of many of the battle fields of the civil war. (See CEMETERY.)—The period required for the body to decay after inhumation varies greatly according to the climate, the nature of the soil, and the covering in which it is enveloped. Orfila and Lesueur in their experiments found nothing but the skeletons left of bodies that had been buried 14, 15, and 18 months; this period was, however, unusually short. Low, damp grounds, particularly when they are percolated by water, hasten decomposition; dry, high, and well ventilated ones, on the contrary, retard it. When numerous burials within a comparatively short period have occurred in a limited space, the earth becomes saturated with the products of decomposition to such a degree as to be incapable of further absorbing them; decomposition under such circumstances is retarded, and its products escape directly into the atmosphere.—*Burying Alive.* Much unnecessary anxiety is sometimes felt with regard to the possibility of persons, supposed to be dead, being buried while still really living. None of the numerous stories of this dreadful accident, however, which have obtained credence from time to time, seem to be authentic. The premature burial of a living person must be, if it happen at all, the result of inexcusable haste or carelessness, and is in the highest degree improbable where even the ordinary precautions are taken. A proper examination of the body by a competent medical man, in doubtful cases, would render such a mistake almost impossible. The signs of death are either immediate or secondary. The immediate signs are stoppage of the movements of the heart and the various consequences which result from their cessation. The secondary signs, which are developed only after a certain time has elapsed, are cadaveric rigidity of the muscles and the commencement of putrefaction. Of all the immediate signs, the only one which by itself is absolutely certain is the complete cessation of the heart's action. This may be ascertained by careful examination of the chest by auscultation. During a fainting fit the heart is still heard to beat, and in the dying,

after the last expiration has proclaimed that it is over, after the pulse has ceased to beat, and after the hand applied over the heart finds everything still, the ear placed upon the same region still hears for a time the beating of that organ; but when, after having listened for a sufficient time, the practised auscultator cannot distinguish the beat of the heart, life is over. In examining the heart in a number of the dying, Bouchat found that the longest interval between the pulsations was six seconds; from a similar investigation M. Rayer found it to be seven seconds. "If," concludes the latter, "the absence of the pulsation of the heart is verified by the auscultator for a period 50 times as great as the longest observed period, or for an interval of five minutes, the patient is undoubtedly dead." Even this, however, admits of some exceptions. In new-born infants the action of the heart may have ceased for a longer period, and yet the child revive, and the same thing is said to have occurred in the cold stage of Asiatic cholera. M. Michel Lévy proposes on these accounts that the verification of decease should take place at two periods, separated by an interval of 24 hours, and considers that if on both these occasions the absence of all movement of the heart for a sufficient length of time is noticed by a competent observer, the interment may take place in perfect safety. When by an excess of precaution further evidence of death may be desired, he recommends the application of an iron heated to redness to the skin; this has the double advantage of distinguishing between real and apparent death, and of rousing the patient energetically where death has not occurred. The application of a red-hot iron to the living body for a length of time sufficient to cause the total destruction of the whole thickness of the skin, the injury being surrounded by a vivid redness, causes in the dead body merely a slight shrivelling of the epidermis, and a searing of the superficial layer of the true skin.—To prevent the occurrence of premature interment, mortuary houses have been built in Germany and other countries, in which the dead are retained for a time before the final interment. A bell-pull is so arranged in connection with the extremities of the corpse, that the slightest motion will sound an alarm, and summon an attendant constantly on the watch. So far, these precautions have been useless; a surgeon who for 45 years had been attached to the mortuary house at Mentz, had during that period but one single alarm; it occurred from the corpse of an old man; the abdomen having subsided from the discharge of a large quantity of fluid, the arms had fallen lengthwise beside the body.—See *Funérailles des Romains, Grecs et autres nations*, by Claude Guichard (Lyons, 1581); *Cérémonies funèbres de toutes les nations*, by Muret (1679); *Die Gräber der Hellenen*, by Stackelberg (Berlin, 1837); *Die Leichenbestattung*, by Trusen (Breslau, 1855); *Histoire des usages funèbres et des sépultures des peuples*

anciens, by C. Feydeau (8 vols., Paris, 1858); *Die heidnische Totenbestattung in Deutschland*, by Weinhold (Vienna, 1859); *Denkschrift zur Leichenverbrennung* (Namslau, 1860); and especially *Traité des signes de la mort, et des moyens de prévenir les enterrements prématurés*, by Eugène Bouchat (Paris, 1849), a work which gained an academical prize. Madame Necker (1790), Dr. Vigné (1841), and others have also written on premature interments.

BURIATS, the collective name of nomadic Mongolian tribes scattered over the S. part of the province of Irkutsk, Siberia, from the Chinese boundary northward toward the upper Lena region, and westward from the Onon to the Oka, a tributary of the Angara. In Transbaikalia they number nearly 200,000, and in other parts about 20,000, and are chiefly agricultural. They have been under Russian domination since the middle of the 17th century, though retaining their local administration under princes and elders of their own selection. They live in yurts or huts, covered with leather in summer and with felt in winter. They are Buddhists, and their idols are made of wood and other materials. Women are regarded as unclean, and are not allowed to approach the altar where the images are placed. The men resemble the Calmucks, and are good horsemen and archers. Agriculture and the chase are the chief means of subsistence; but several trades, especially that of forging iron, are carried on. Their language is a branch of the Mongolian, and though there is no distinct literature, several native Buriats, as Dorji Bansaroff and Galsang Gomboeff, have recently acquired eminence in science. Schiefner has prepared from the literary remains of Castrén a grammar and a dictionary of the Buriat language (St. Petersburg, 1857).

BURIDAN, Jean, a French philosopher of the 14th century, born at Béthune, in Artois. He studied at the university of Paris, of which he became rector in 1347. He was a disciple of Occam, and his best works relate to the philosophy of Aristotle. He was prominent in the school of nominalistic philosophy, and several contradictory stories are told of the incidents of his life. His celebrity in modern times arises from a popular illustration, attributed to him, of the determining reasons in reference to the action of the will. According to it, an ass, placed midway between two bundles of hay, equally attractive, would maintain his position, and die of starvation, from want of a reason determining him to turn to one side or the other for the purpose of satisfying his appetite. This illustration of the theory opposed to the doctrine of free will, popularly known as "Buridan's ass," is not to be found in Buridan's writings, nor is it of his invention. It is found, in a somewhat different form, in Aristotle, and is fully stated in the opening verses of the fourth canto of Dante's "Paradise."

BURIGNY, Jean Lévesque de, a French author, born at Rheims in 1692, died in Paris, Oct. 8,

1785. In 1718 he removed to Paris, where, in conjunction with his two brothers, he engaged in the compilation of a manuscript encyclopædia, which when completed formed 12 large folio volumes, whence he drew the materials for many of his subsequent publications. His treatise on the papal power (4 vols. 12mo) is not much esteemed; but his lives of Erasmus, Grotius, Bossuet, and Du Perron are valuable.

BURKE. I. A W. county of North Carolina, intersected by the Catawba river; area, 450 sq. m.; pop. in 1870, 9,777, of whom 2,814 were colored. It abounds in beautiful mountain scenery, and is traversed by the Blue Ridge near its N. W. border. The soil is generally fertile, and affords excellent pasturage. The Wilmington and North Carolina railroad passes through it. The chief productions in 1870 were 26,528 bushels of wheat, 217,049 of Indian corn, 31,010 of oats, 10,093 of Irish and 12,842 of sweet potatoes, 68,076 lbs. of butter, and 25,204 of tobacco. There were 800 horses, 719 milch cows, 2,681 other cattle, 4,728 sheep, and 10,000 swine. Capital, Morgantown. II. An E. county of Georgia, separated from South Carolina by the Savannah river, bounded S. by the Ogeechee, and intersected by Brier and Buckshead creeks; area, 1,040 sq. m.; pop. in 1870, 17,679, of whom 18,436 were colored. It is somewhat hilly, but the soil is fertile. The Central Georgia railroad and the Augusta and Savannah branch pass through it. The chief productions in 1870 were 203,735 bushels of Indian corn, 18,347 of sweet potatoes, and 14,290 bales of cotton. There were 1,097 horses, 1,650 mules and asses, 4,277 milch cows, 1,648 other cattle, and 11,157 swine. Capital, Waynesborough.

BURKE, Edmund, an American jurist, born in Galway, Ireland, in 1743, died in Charleston, S. C., in March, 1802. He was educated for the church, but became a lawyer, and after a visit to the West Indies went to South Carolina and served as a volunteer in the revolutionary army. In 1778 he was appointed judge of the supreme court of the newly organized state. When Charleston was captured in 1780, he again joined the army, and in 1782 returned to the bench. He opposed the adoption of the federal constitution because he feared consolidated power, and wrote a pamphlet against the aristocratic features of the society of the Cincinnati, which was translated into French by Mirabeau. He was a member of congress in 1789-'91, of the state legislature for a number of years, and eventually became chancellor of South Carolina. He was witty, accomplished, upright, and eccentric.

BURKE, Edmund, an English statesman, born in Dublin, Jan. 1, 1730, died at Beaconsfield, England, July 9, 1797. He was one of 14 or 15 children of Richard Burke, an attorney, descended from the Norman De Burghs who early settled in Ireland. His mother was of the ancient Irish family of Nagle, of Castletown Roche, county of Cork, and a grand-niece of

Ellen Nagle, the wife of the eldest son of the poet Spenser. He entered Trinity college, Dublin, as a pensioner in 1744, Oliver Goldsmith being a fellow student. He took his bachelor's degree in 1748, and in 1750 went to London, where he had previously been entered as a law student of the Middle Temple. But he abandoned the law, and after an unsuccessful application for the chair of logic in the university of Glasgow, devoted himself to literary labors. His father made ample allowance for his maintenance, and there seems to be no foundation for the report of his having been at that time without any resources excepting his pen. He contributed political articles to the periodical press, but his first separate production, "A Vindication of Natural Society," purporting to have been written by "a late noble writer," did not appear till 1756 (new ed., 1765), and was ascribed to Bolingbroke, whose style was admirably imitated, although it was written with a brilliancy and fervor to which Bolingbroke never attained. The "Philosophical Inquiry into the Origin of our Ideas of the Sublime and Beautiful" (1756), written when Burke was in his 27th year, secured for him the regard of Johnson, Reynolds, and other eminent men, and placed him at the head of the æsthetical critics of his day. In 1757 he visited Bath for the improvement of his health, and lived in the house of his physician and remote kinsman, Dr. Christopher Nugent, whose daughter Jane Mary he married the same year. Speaking of her he long afterward said, "Every care vanished the moment I entered under my own roof." She bore him two sons, one of whom died in infancy, and the other, Richard, in 1794. After his return to London appeared "An Account of the European Settlements in America" (2 vols., London, 1757). Burke's autograph receipt for 50 guineas to Dodsley, the publisher of this work, is still extant, and internal evidence indicates him as the author, although doubts have been expressed on the subject, and it is not included in the common editions of his works. The abbé Raynal made use of it in his work on the American revolution, and Dugald Stewart and Prior praise it highly. He directed for many years the "Annual Register," established by Dodsley in 1759. Previous to this he had commenced for that publisher an "Essay toward an Abridgment of the English History" (London, 1757), bringing the narrative down to the time of King John. The reason for its discontinuance is not known. About this time Burke was introduced by the earl of Charlemont to William Gerard Hamilton, popularly known as Single-Speech Hamilton, secretary to Lord Halifax, the newly appointed lord lieutenant of Ireland. In 1761 he became Hamilton's private secretary, and in 1763 received a pension of £300. Hamilton had been instrumental in procuring this pension, and conceived that he had thereby bound the recipient to him for life. Burke therefore resigned the secretaryship and threw up the pension, which

he had enjoyed only a year. Upon the fall of the Grenville administration in 1765, the marquis of Rockingham, the new prime minister, appointed Burke his private secretary, and he was soon afterward returned to parliament for Wendover, Buckinghamshire, a borough belonging to Lord Verney. The very day he took his seat, Jan. 14, 1766, he made remarks on the address of thanks to the throne in a strain of eloquence which attracted the attention of Pitt, afterward earl of Chatham. He speedily became the animating spirit of the Rockingham administration, and in the stormy debates relating to the American stamp act he was the most effective in urging moderate and conciliatory measures. Out of the house, as well as in it, his industry was indefatigable, while his knowledge of colonial affairs was exceedingly useful. On the dissolution of the Rockingham administration in July, 1766, Burke published anonymously "A Short Account of a late Short Administration," in which he vigorously defended the policy of the whigs. In the compromise cabinet which Lord Chatham undertook to form he was offered a place, which he declined, as he did a similar offer on the part of the duke of Grafton in 1767. The parliament was dissolved in 1768, when Burke was again returned for Wendover. About the same time he purchased for £20,000 a fine estate near Beaconsfield, Buckinghamshire; a part of the purchase money having been advanced, at first as a loan, and afterward as a gift by the marquis of Rockingham. In 1769 Burke published his "Observations on a late Publication, entitled 'The Present State of the Nation'" (5th ed., 1782), which latter was ascribed to Mr. Grenville or to his former secretary, Mr. Knox, and in 1770 he celebrated "Thoughts on the Cause of the Present Discontents." In November, 1771, he was appointed agent of New York to represent the interests of that colony in England, for which he received a salary of £700. During the sessions of 1772-3 he distinguished himself by his masterly and elaborate reviews of the affairs of the East India company. Still more did he distinguish himself during the next session, 1774, on the state of the American colonies, then driven almost into insurrection by the course of the English government. His great speech on American taxation was delivered on April 19 of that year. On the dissolution of the parliament he was nominated for the city of Bristol, for which he was returned on Nov. 3, after a severe contest of 27 days. On March 22, 1775, he delivered another remarkable speech in behalf of the Americans, which he subsequently published. His zealous support of the colonies rendered him unpopular with his constituents, and he was compelled to defend himself in "Two Letters to Gentlemen of Bristol." All the while the questions of the Catholic disabilities and of the trade with Ireland occupied a large share of his attention. On Feb. 11, 1780, he introduced his

celebrated bills for regulating the household, the army, navy, and pension pay offices, ordnance, the mint, the exchequer, &c.; these he commended in a speech on "Economical Reform," which is almost without a parallel in the records of parliamentary eloquence. But his talents did not reconcile the electors of Bristol to his politics, and declining a reelection, he was returned for Malton, which borough he continued to represent during the remainder of his public career. The Rockingham party again coming into power in March, 1782, Burke became a privy councillor and paymaster general of the forces; but, not possessing an aristocratic family connection, he was not allowed a seat in the cabinet. No office in the gift of the government was more lucrative than that of paymaster; yet Burke's first act was to introduce a bill for its reorganization, which materially lessened his own emoluments. In that department alone he was said to have effected an annual saving of £47,000. On the death of the marquis of Rockingham, Burke retired for a time; but the ministry of the duke of Portland in 1783 restored him to his former place. In that year he began his labors on East Indian affairs, with his voluminous reports on the administration of justice in Bengal and other provinces; and for several years he was absorbed in the investigations and trials which arose out of the subject. During this time he conducted the impeachment of Warren Hastings for maladministration of the government of India. His great speech, shortly after the opening of the session of 1786, on presenting the articles of impeachment, is a masterpiece of eloquence. He regarded this impeachment as the crowning act, and destined to be the glory or shame, of his public life. It is now acknowledged to have been its crowning glory. When the French revolution broke out, Burke undertook to oppose its principles and influence. In 1790 appeared his "Reflections on the Revolution of France," a letter to a French gentleman, of which 80,000 copies were at once sold, and which was translated into French by Dupont. It was an eloquent production, and gave rise to many sharp controversies, leading to an open rupture with Fox, who had been associated with him in the impeachment of Hastings, and was now the whig leader in the house of commons. Their formal separation was an affecting scene. Fox paid a warm tribute to the character and genius of his old friend, now his opponent. Burke was henceforth isolated from his former political friends, but continued his activity, publishing his "Appeal from the New to the Old Whigs" (1791), "Letters to Sir Hercules Langrishe" (1792), "Thoughts on French Affairs," "Remarks on the Policy of the Allies" (1798), and many other pamphlets. He retired from the house of commons June 20, 1794. In the following August he was deeply affected by the death of Richard Burke, his only surviving son, but he still retained his cheerfulness and activ-

ity. In 1795 he received a pension of £1,200 from the civil list, and soon after another of £2,500 from the 4 per cent. fund. In his retirement his pen was still busy, and in a "Letter to a Noble Lord," and "Two Letters on the Proposal for a Regicide Peace," he showed all his original power. Not long before his death he founded a school for the children of French emigrants. He retained his faculties to the last, and had Addison's essay on the immortality of the soul read to him on his deathbed. Mr. Fox, in proposing his interment in Westminster abbey, drew tears from almost every one present in the house of commons. Burke's genius has been extolled by Sir Robert Peel, Earl Russell, and other eminent men. Macaulay regarded him, in aptitude of comprehension and richness of imagination, as above every orator, ancient or modern; and Wilhelm von Schlegel in his "Lectures on Literature" awards him high praise for having been to England and to all Europe, and especially to Germany, a new light of political wisdom and moral experience. His conversational power was as remarkable as were his oratorical efforts and his written works. The authorship of the letters of Junius was at one time ascribed to Burke, and it was at all events believed that he knew who the author was, but he never made any disclosures on the subject.—The present representative of the family of Burke is his grand-nephew Thomas Haviland Burke, a London lawyer, and son of Lieut. Col. Thomas Haviland by Mary French, a daughter of Burke's sister Juliana.—Earl Fitzwilliam, in conjunction with Lieut. Gen. Sir Richard Bourke, a relative of Burke, edited the correspondence of Edmund Burke, 1744-'97 (4 vols., London, 1826-'44), reprinted in the new edition of Burke's works and correspondence (8 vols., 1852). James Prior wrote "Memoirs of the Life and Character of Burke" (2 vols., London, 1824); the Rev. George Croly, "Memoir of the Political Life of the Right Hon. Edmund Burke" (2 vols., 1840); Peter Burke, "The Public and Domestic Life of Edmund Burke" (1853); and Thomas Macknight, the "Life and Times of Burke" (3 vols., 1858-'61). An excellent edition of his works, edited by George Nichols, was published at Boston in 1865-'7, 12 vols. 8vo (12 vols. 16mo, 1869).

BURKE, Sir John Bernard, an English genealogist, born in London in 1815. His father, John Burke, who died in 1848, was cadet of an ancient family in Ireland, and became attached as reporter and editor to the London press. He originated many literary speculations, among others the "Standard Novels," a series of cheap republications, with new introductions by the authors. He was the founder and first editor (subsequently assisted by his two sons) of "Burke's Peerage and Baronetage," the most complete and accurate work of its kind, a new edition being published each year (84th ed., 1872). In May, 1857, the copyright of this work was sold for a large sum, although

burdened with the payment of £400 per annum to whichever of Mr. Burke's sons should edit the "Peerage," as long as it continued to be published. Sir J. Bernard Burke was called to the English bar at the Middle Temple in 1839, succeeded Sir William Betham as "Ulster king of arms of all Ireland" in 1853, and was knighted in 1854. He succeeded his father as editor of the "Dictionary of the Peerage and Baronetage," and has also written the "History of Dormant, Abeyant, Forfeited, and Extinct Peerages," "History of the Landed Gentry," "Vicissitudes of Families," and several other works on kindred subjects.

BURKE, John Doly, an American historian, born in Ireland, killed in a duel caused by a political quarrel, April 11, 1808, near Campbell's bridge, Va. He was educated at Trinity college, Dublin, emigrated to America in 1797, conducted a newspaper in Boston, and subsequently one in New York, where he was arrested under the sedition law. He then removed to Petersburg, Va., where he practised law. He wrote "Bunker Hill" and several other historical dramas, and a "History of the late War in Ireland" (1797). His best work, the "History of Virginia from the first Settlement down to 1804," was in three volumes, to which a fourth was added in 1816, written by L. H. Girardin and Mr. Jones. A memoir of Burke, by C. Campbell, was published in 1868.

BURKE, Robert O'Hara, an Australian explorer, born in county Galway, Ireland, in 1821, died in Australia in June, 1861. He received a collegiate education in Belgium, served in the Austrian army, was for several years a member of the mounted police after his return to Great Britain in 1848, and subsequently went to Australia. He served there for seven years as inspector of police, and during that time went to England to take part in the Crimean war, but arrived too late. He left Melbourne Aug. 20, 1860, at the head of a finely organized government expedition to cross the continent from south to north. Some of the men soon abandoned the enterprise, while others were left in charge of a relief camp at Cooper's creek. Burke, accompanied by the astronomer Wills, and by King and Grey, started from that point Dec. 16, and travelled about 800 m. in a N. W. direction with only six camels and one horse, after which they turned eastward, keeping nearly due N. on the meridian of 140°, and reaching on Feb. 11, 1861, one of the numerous streams falling into the gulf of Carpentaria about lat. 17° 30' S. and lon. 140° E., which Wills identified as the Cloncurry, but which had long been supposed to be the Flinders river. They crossed swamps and found a channel through which the sea water entered, but do not seem to have actually set foot on the shores of the gulf. Their home journey, commenced Feb. 19, 1861, was attended by even more grievous hardships than they had previously endured; and they reached the relief camp at Cooper's creek on April 21, only to find that it had been deserted

on the previous day by the party in charge of it, who had given up all hope of seeing them again. Burke and his companions perished from starvation and exposure, excepting the sailor King, who was reduced almost to a skeleton when a searching expedition under Howitt's command found him on Sept. 15 with a party of aborigines who had given him shelter. Several expeditions were set on foot, and after a protracted search the remains of Burke and Wills were found in the neighborhood of Cooper's creek. Among the travellers who followed the tracks of Burke, Landsborough, leader of an expedition started by the authorities of Victoria and Queensland, succeeded in 1862 in likewise crossing the continent from south to north; and McKinlay, at the head of another expedition under the auspices of the Southern Australian authorities, performed the same feat, though taking a somewhat different route. Burke's name has been given to an extensive district S. of the gulf of Carpentaria, and to several localities in that region, in commemoration of his services and fate.

BURKE, Thomas Nicholas, an Irish Dominican preacher, born in Galway in 1830. He received priestly orders in 1856, and is a member of the convent of St. Saviour's, Dublin. His eloquence has caused him to be yearly called to Rome, where he was partly educated, to preach during Lent. In October, 1871, he came to the United States as "visitor general" of his order, and preached and lectured almost daily here or in Canada. A very large sum of money was thus realized for public charities. The interest produced by his discourses was much increased by a public controversy with the historian Froude, who was lecturing in the country at the same time on his representations of the Irish race. Father Burke returned to Europe Feb. 22, 1873. His lectures and sermons were collected and published by P. M. Haverly (New York, 1872).

BURKEL, Heinrich, a German painter, born at Pirmasens, Bavaria, Sept. 9, 1802, died June 10, 1869. He studied in Munich and Rome, and among his works are many pictures of common life in Italy, Bavaria, and Tyrol, with landscapes. His painting of brigands in the Campagna di Roma is especially renowned.

BURLAMAQUI, Jean Jacques, a Swiss writer upon law, born in Geneva, July 24, 1694, died April 3, 1748. His education was directed by his father, a learned man and secretary of the republic. Before he was 26 years old he was appointed honorary professor of jurisprudence in the university of Geneva. He travelled in England, Holland, and France, and returning to Geneva in 1723, he began his course of lectures, which brought great reputation to himself and the university. In 1740 he resigned his professorship on account of ill health, and became a member of the sovereign council, where he continued to render service to the state until his death. The writings of Burlamaqui are remarkable for the clearness

and precision of their style, and have been used as text books in several of the German universities, and in that of Cambridge, England. He found many of his materials in Grotius, Pufendorf, and Barbeyrac, but these he reduced to simplicity and order. His principal works are, *Principes du droit naturel* (1747), and *Principes du droit politique* (1751).

BURLEIGH, or **Burghley**, **William Cecil**, lord, an English statesman, born at Bourne, Lincolnshire, Sept. 13, 1520, died Aug. 4, 1598. His father was master of the robes to Henry VIII. He was educated for the law, and a debate with two priests, in which he attacked papal supremacy, so pleased the king that Cecil was at once received into royal favor. In 1547 he was appointed master of requests by the lord protector Somerset, whom he accompanied the same year in the Scotch expedition, and was present at the battle of Musselburgh. After the death of Henry, Cecil continued in favor with Edward VI., and was appointed secretary of state in 1548. On the fall of Somerset, who had been his friend and patron, Cecil was for a time involved in his disgrace; but after three months' confinement in the tower he was restored to his office in 1551 by the duke of Northumberland, and was soon afterward knighted and sworn a member of the privy council. Cecil avoided compromising himself in the question of the succession, and adroitly seized an opportunity as soon as he saw that the cause of Mary was likely to be successful, and tendered his submission. During the reign of Mary he took no important part in public affairs, and though a Protestant at heart conformed outwardly to the queen's religion, and thereby preserved a share of royal favor. Being chosen in 1555 one of the members for Lincolnshire, he took part in the debates of the house of commons, and ventured to oppose the government, but in a temperate manner. When Mary's increasing ill health indicated the prudence of such a step, Cecil opened a correspondence with the princess Elizabeth, who on her accession to the throne appointed him her secretary. Thenceforward till the end of his long life he was in reality Elizabeth's prime minister. In 1571 he was created Baron Burleigh, and in the following year he received the order of the garter and was made lord high treasurer. The wise and eminently prudent policy which distinguished the reign of Elizabeth is no doubt traceable to Burleigh. Accustomed to thread his way through the wiles of diplomacy, Burleigh was always well informed of the plots which were continually in progress or contrivance against the queen's person or the peace of the country, and thwarted them by his sagacity and caution. Burleigh's public life is the reign of Queen Elizabeth. Leicester, Essex, and Raleigh were the personal favorites of the queen, but Burleigh alone held the helm of state. His private life was calm and undisturbed, his personal habits quiet and frugal. His thrift sometimes approached

avarice, but he was honest and upright in his public dealings. He was twice married: in 1541 to a sister of Sir John Cheke, who died, leaving one son, Thomas, afterward earl of Exeter; his second wife was Mildred, daughter of Sir Anthony Cook, by whom he had Robert, his associate and successor, afterward earl of Salisbury, and two daughters. He survived his second wife by only a few years.

BURLEIGH, **William Henry**, an American author and journalist, born at Woodstock, Conn., Feb. 2, 1812, died in Brooklyn, N. Y., March 18, 1871. At the age of 17 he was apprenticed to a printer, and worked at his trade till 1833, when he became editor of the "Literary Gazette," Schenectady, N. Y., subsequently of the "Christian Witness," Pittsburgh, Penn., "The Charter Oak," Hartford, Conn., and the "Washington Banner." He also contributed prose and verse to several periodicals, and in 1840 issued a volume of poems. He was an early and prominent advocate of the anti-slavery cause.—Of his brothers, **George S.** has published "The Maniac and other Poems" (1849), and **Charles C.**, a lecturer, "Thoughts on the Death Penalty" (1845).

BURLESON, a central county of Texas, bounded E. by the Brazos river, S. by the Yegua, one of its branches, and watered by affluents of the Yegua; area, 976 sq. m.; pop. in 1870, 8,072, of whom 3,021 were colored. The surface is uneven; the soil of the lowlands is a sandy loam, in many places very productive; that of the uplands is lighter. About three fourths of the surface is covered with oak forests. The chief productions in 1870 were 228,929 bushels of Indian corn, 6,423 bales of cotton, and 14,200 lbs. of wool. There were 3,117 horses, 4,110 milch cows, 13,908 other cattle, 6,163 sheep, and 14,915 swine. Capital, Caldwell.

BURLINGAME, **Anson**, an American diplomatist, born in New Berlin, Chenango co., N. Y., Nov. 14, 1820, died in St. Petersburg, Russia, Feb. 23, 1870. His father, who was a farmer, removed when Anson was three years old to a farm in Seneca co., Ohio, where they lived for ten years, and in 1833 again removed to Detroit, and after two years more to a farm at Branch, Mich. In 1837 Anson was admitted to the university of Michigan, and six years later went to Cambridge, Mass., and entered the law school of Harvard university, where he graduated in 1846. He began the practice of the law in Boston, and a year or two later became an active member and a popular orator of the free-soil party, then recently formed. In the political campaign of 1848 he acquired a wide reputation as a public speaker in behalf of the election of Van Buren and Adams. In 1849-'50 he made a visit to Europe. In 1852 he was elected to the Massachusetts senate, and in 1853 he served as a member of the state constitutional convention, to which he was elected by the town of Northborough, though he resided in Cambridge. He joined the Ameri-

can party on its formation in 1854, and was in that year elected by it to the 34th congress. In the following year he cooperated in the formation of the republican party, to which he ever afterward steadily adhered. In congress he bore himself with courage and address, and was recognized as one of the ablest debaters on the anti-slavery side of the house. For the severe terms in which he denounced the assault committed by Preston S. Brooks upon Senator Sumner in 1856, he was challenged by Brooks. He promptly accepted the challenge, and named rifles as the weapons to be used, and Navy island, just above Niagara Falls, as the place of fighting. To the latter proposition Mr. Brooks demurred, alleging that, in order to meet his opponent in Canada, in the then excited state of public feeling, he would have to expose himself to popular violence in passing through "the enemy's country," as he called the northern states. The matter presently fell through, but the manner in which Mr. Burlingame had conducted himself greatly raised him in the estimation of his friends and of his party; and on his return to Boston at the end of his term he was received with distinguished popular honors. He was reelected to the 35th and 36th congresses; but failing, after an animated and close contest, to be returned to the 37th, his legislative career ended in March, 1861. He was immediately appointed by President Lincoln minister to Austria; but that government declining to receive in a diplomatic capacity a man who had spoken often and eloquently in favor of Hungarian independence, and had moved in congress the recognition of Sardinia as a first-class power, he was sent as ambassador to China. In 1865 he returned to the United States with the intention of resigning his office; but the secretary of state urged him to resume his functions for the purpose of carrying forward important projects and negotiations which he had initiated. To this he finally consented. When in 1867 he announced his intention of returning home, Prince Kung, the regent of the empire, offered to appoint him special ambassador to the United States and the great European powers for the purpose of framing treaties of amity with those nations—an honor never before conferred on a foreigner. This position Mr. Burlingame accepted, and at the head of a numerous mission he arrived in the United States in March, 1868. On July 28 supplementary articles to the treaty of 1858 were signed at Washington, and soon afterward ratified by the Chinese government. These marked the first official acceptance by China of the principles of international law, and provided, in general, that the privileges enjoyed by western nations under that law—the right of eminent domain, the right of appointing consuls at the ports of the United States, and the power of the government to grant or withhold commercial privileges and immunities at their own discretion subject to treaty—should be secured to China; that nation undertaking

to observe the corresponding obligations prescribed by international law toward other peoples. Special provisions also stipulated for entire liberty of conscience and worship for Americans in China and Chinese in America; for joint efforts against the coolie trade; for the enjoyment by Chinese in America and Americans in China of all rights in respect to travel and residence accorded to citizens of the most favored nation; for similar reciprocal rights in the matter of the public educational institutions of the two countries, and for the right of establishing schools by citizens of either country in the other. The concluding article disclaims on the part of the United States the right of interference with the domestic administration of China in the matter of railroads, telegraphs, and internal improvements, but agrees that the United States will furnish assistance in these points on proper conditions, when requested by the Chinese government. From America Mr. Burlingame proceeded in the latter part of 1868 to England, and thence to France (1869), Denmark, Sweden, Holland, and Prussia, in all of which countries he was favorably received, and in all of which but France, to which he intended returning later, he negotiated important treaties or articles of agreement. Reaching St. Petersburg early in 1870, he had just entered upon the business of his mission when he died of pneumonia after an illness of only a few days.

BURLINGTON, a central county of New Jersey, extending entirely across the state and bounded S. E. by the Atlantic and N. W. by the Delaware river; area, 600 sq. m.; pop. in 1870, 53,689. Several streams falling into the Atlantic and the Delaware water it. The surface is level. The soil near the river is remarkably fertile; in other localities it is sandy. Pine woods are found in various parts of the county. Bog iron ore is abundant, and in the western portion are frequently found, imbedded in marl, petrified vegetables and animal relics. It is intersected by the Camden and Amherst, the Mt. Holly branch and the Atco branch of the New Jersey Southern, the Camden and Burlington County, and the Pemberton and Hightstown railroads. The chief productions in 1870 were 200,120 bushels of wheat, 102,411 of rye, 983,879 of Indian corn, 175,738 of oats, 581,955 of Irish and 114,517 of sweet potatoes, 53,165 tons of hay, 494,769 lbs. of butter, and 47,247 of wool. There were 6,407 horses, 1,288 mules and asses, 14,796 milch cows, 3,852 other cattle, 1,669 sheep, and 15,760 swine. Capital, Mount Holly.

BURLINGTON, a city, port of entry, and the capital of Chittenden co., Vermont, on a bay of the same name, upon the E. shore of Lake Champlain, 40 m. by rail N. W. of Montpelier; pop. in 1870, 14,887. It is the largest city in the state, and is noted for its beauty of situation, grandeur of scenery, and sublime views. It stands on a gentle slope, the ground rising gradually from the lake till it reaches the height

of nearly 300 ft., giving a lake view to all parts of the city. At the apex of this inclined plane, overlooking the entire city, stands the university of Vermont. Among other buildings of note are St. Mary's Roman Catholic cathedral, seven churches, the court house, custom house, city hall, and Fletcher free library of 8,000 volumes. In Green Mount cemetery is the tomb of Gen. Ethan Allen, who died here in 1789; over this the state has erected a granite monument, with a shaft $4\frac{1}{2}$ ft. in diameter and 42 ft. high, bearing the inscription "Ticonderoga," above which is a heroic statue of Gen. Allen $8\frac{1}{2}$ ft. high, placed in position and unveiled in the presence of 10,000 spectators, July 4, 1873. The city is supplied with water from the lake, forced into a reservoir on the crest of the hill, and thence by pipes carried to all parts of the city, and with force sufficient to raise it above the highest buildings. Burlington has an excellent harbor, the best on the lake, easy of access, and protected on the only exposed side by a breakwater 3,000 ft. long, on each end of which stands a beacon light; another light on Juniper island guards the entrance into the bay. As a lumber mart, it ranks with the first three in the United States. The public free schools, under a board of five commissioners, elected by vote of the city, are organized into one graded and one ungraded school. The former has four grades, viz.: primary, intermediate, grammar, and high school, each requiring a three years' course, making a twelve years' course from the lowest primary class to the graduating class in the high school. There are 84 teachers employed, at an aggregate salary of \$16,000. The city contains about 3,000 children of school age. Besides the above there are the Vermont Episcopal institute at Rock Point, for males only, a ladies' seminary, and four Roman Catholic schools. The university of Vermont was founded in 1791. It comprises an academical department, a medical college, and the agricultural college, organized in 1865 by means of the national grant of 150,000 acres of land. By vote of the trustees in 1872, the university is open to females. It has 21 instructors, 138 students, a library of 16,000 volumes, and a museum containing more than 45,000 specimens. Two daily and five weekly newspapers are published.—The first permanent settlement at Burlington was made in 1788; the first town meeting on record was in 1787; and the first meeting house (Congregational) was erected in 1795. In 1864 a city charter was granted.

BURLINGTON, a city and port of entry of Burlington co., N. J., on the Delaware river, at the mouth of Assiscunk creek, 18 m. N. E. of Philadelphia; pop. in 1870, 5,817. It was founded in 1677, principally by members of the society of Friends. It is situated on the Camden and Amboy railroad, and is connected with Philadelphia by lines of steamers, and by a branch railroad with Mount Holly. The city contains two hotels, two boarding

schools, several churches and banks, an ancient library, which contains a large collection of rare and valuable works, and public schools which are richly endowed by a legacy of land from one of the early settlers, now become exceedingly productive. Three weekly newspapers are published. Burlington college, an Episcopal institution, educates a large number of students; and St. Mary's hall, also under the supervision of the Episcopalians, in 1871 had 28 instructors, of whom 20 were females, 209 pupils, and a library of 2,400 volumes. For the year ending June 30, 1871, there were registered, enrolled, and licensed at the port 131 vessels, with an aggregate tonnage of 12,525.—Burlington was long the seat of government for West Jersey, and was the official residence of the last colonial governor, William Franklin. It carried on a lucrative commerce with the West Indies both before and after the laying out of Philadelphia, built vessels, and subsequently built and fitted out a large privateer, which cruised successfully against the French. It was made the see of a bishop, and St. Mary's Episcopal church was liberally endowed by Queen Anne with land in and near the city, much of which is held to the present day, together with a massive communion service, presented by the same princess. A printing office and newspaper were established in 1777. As Philadelphia increased, Burlington declined.

BURLINGTON, a city and the county seat of Des Moines co., Iowa, 137 m. S. E. of Des Moines, and 207 m. by railroad W. S. W. of Chicago, on the W. bank of the Mississippi river, about 14 m. N. of an easterly extension of the main boundary line between Iowa and Missouri; pop. in 1870, 14,938. The W. bank of the Mississippi at this point consists mostly of steep cliffs of carboniferous limestone 150 ft. high, furnishing an abundance of excellent materials for building, paving, and the manufacture of lime. The stone quarries in this formation are rich in the organic fossils of the carboniferous era, particularly of the crinoid family. The summits of these cliffs are capped with some 30 or 40 feet of diluvial clay, that, with a rich surface stratum of vegetable mould, forms the table land of the surrounding country. At the base of these cliffs the slope of their débris passes into the river. This deep embankment is scooped out through the centre of the city by the waters of a small creek, called the Hawkeye, which enters the Mississippi nearly at right angles. On either side of this creek, and to the west, about half a mile from the river, where the creek branches to the right and left, the ground gradually rises to the level of the surrounding table land, thus giving to the central portions of the town an arrangement similar to an amphitheatre, and adding much to its beauty and salubrity. On the opposite side of the river low lands, mostly subject to occasional inundation, extend some 7 or 8 m. to the Illinois bluffs. The business portion of the city is built upon the low ground along the

river, while the residences upon the high bluffs command extended views of the fine river scenery. The river at this point is a broad, deep, and beautiful stream of clear water, and upon the bluffs between which it passes are orchards and vineyards. The city is regularly laid out and well built, the houses being chiefly of brick. In 1871 there were 8 public schools, with 87 teachers and 1,451 pupils. The Burlington business college was organized here in 1865, and in 1871 had 5 teachers and 202 students. Burlington university, a Baptist institution, was organized in 1854. There are about 15 churches, a public library, two daily newspapers with weekly editions, one tri-weekly and weekly (German), and one monthly periodical. The extensive coal fields in the vicinity afford great facilities for manufacturing; the chief establishments are flouring mills, saw mills, founderies, pork-packing houses, breweries, and soap factories. The following railway lines centre here: Chicago, Burlington, and Quincy, the Carthage branch of the same, Burlington and Keokuk, and Burlington and Missouri River. The town was laid out in 1834, and from 1837 to 1840 was the capital of Iowa.

BURLINGTON, Richard Boyle, earl of, an English architect, born April 25, 1695, died in 1758. He studied architecture in Italy, but had no admiration for the Gothic. The works of Inigo Jones and of Palladio won his admiration, and on the principle which these exhibited he erected many buildings, of which the best known are his own villas at Cheswick and at Lanesborough in Yorkshire, the front of Burlington house (purchased by government for scientific societies, &c.), the dormitory at Westminster school, mansions for several noblemen, his friends, the reparation of St. Paul's church, Covent Garden (by Inigo Jones), and the assembly room at York, which is his best work. He was the friend of Pope, who eulogized him in his "Fourth Epistle."

BURMAH, or the **Kingdom of Ava**, a state in the S. E. of Asia, beyond the Ganges, reaching from lat. $19^{\circ} 25'$ to $28^{\circ} 15'$ N., and from lon. $98^{\circ} 2'$ to $102^{\circ} 10'$ E.; area, about 200,000 sq. m.; pop. estimated at about 4,000,000. It is bounded N. by upper Assam and Thibet, E. by the Chinese province of Yun-nan, S. E. by Anam, S. by Laos and Pegu, and W. by Aracan, surrendered to the English by the treaty of 1826, and by Tiperah, Munipoor, and Assam, from which countries it is separated by high mountain ridges. Two thirds of the territory belongs to Burmah proper, the rest forming the territories of tributary states. Burmah has neither alluvial plains nor a seaboard, its southern frontier being 200 m. from the mouths of the Irrawaddy. The country in the north is mountainous, gradually declining southward. In the central parts are wide valleys formed by parallel branches of the Thibetan plateau. The two principal chains form the W. and E. limits of the empire. The moun-

tains of Anapetomu, or Yomadong, which determine the W. boundary, penetrate into Pegu, and extend as far as Cape Negrais; the highest point is about 8,000 ft. The chain that extends on the E. side, separating the Irrawaddy and Salwen valleys, terminates at the gulf of Martaban; its highest point is about 12,000 ft., and is covered with perpetual snow. Four other parallel branches running south form three wide valleys. Two mountain passes traversing the Anapetomu range connect Burmah with Aracan. The northern connects Shembeghewn on the Irrawaddy, lat. $20^{\circ} 40'$, with Aeng in Aracan, $19^{\circ} 53'$, and hence is called the Aeng pass. The southern pass begins likewise at Shembeghewn, and leads to Talak in Aracan, lat. $20^{\circ} 10'$ N. The northern extremity of Burmah is separated by mountain ranges from the neighboring country. The lofty ranges called the Patkoi mountains, and the still higher Langtan chain, divide it from Assam and the countries along the upper Brahmapootra. In the high summits whence the Brahmapootra descends to the west are the sources of the Irrawaddy, the chief river of Burmah. The Khyen-Dwen rises in the Patkoi mountains, flows S. W. and S. under various names, receives several affluents, and discharges into the Irrawaddy after a course of about 600 m. The other rivers are the Salwen, E. of the Irrawaddy; the Sittoung, between the Irrawaddy and the Salwen; and the Aracan. All these rivers, following the course of the mountain chains, flow S. and fall into the gulfs of Bengal and Martaban. There are several lakes, the most important of which is the Kandungey, called also the Royal lake, 25 m. from Ava. It is about 30 m. long by 9 broad, and is fed by the Moa, one of the principal tributaries of the Irrawaddy. The valley of the Irrawaddy is hilly and uneven, and sometimes the hills form its banks. They are generally covered with forest trees of considerable size. Cultivation here is confined to the narrow flat tracts which here and there separate the hills from the river. The plains in the south are fertile, and produce large crops of rice. The valleys in the centre and north are well watered and team with rich pasturage.—Burmah has been deprived of its most fertile territory, but that which remains is productive. Agriculture and horticulture are defective. Of garden vegetables, the onion and the capsicum are most generally cultivated; there are also yams, sweet potatoes, melons, cucumbers, and egg plants. The young shoots of bamboo, wild asparagus, and the succulent roots of various aquatic plants, supply the place of garden fruits. Mangoes, pineapples, oranges, custard apples, the jack (a species of breadfruit), the papaw, cocoanut, fig, and plantain are the chief fruits. The principal crops are rice, maize, millet, wheat, various pulses, palms, sugar cane, tobacco, cotton, and indigo. The art of making sugar is scarcely known. Coarse

sugar is obtained from the juice of the *Palmyra* palm, of which numerous groves are found, especially south of the capital. Indigo is so badly managed as to be almost unfit for exportation. Rice in the south and maize and millet in the north are the standard crops. *Sesamum* is raised for cattle. On the northern hills the tea plant is cultivated; but the natives, instead of steeping it, eat the leaf prepared with oil and garlic. Cotton is raised chiefly in the dry lands of the upper provinces; silk is produced in some districts. The principal trees are the teak and *hopoa*, which furnish valuable timber. In Amarapura are extensive forests of fir. On the upper Salwen is found the oil tree, one of which will produce 80 or 40 gallons of oil a year. Other trees are the cocoa palm, betel, *palmyra nissa*, bamboo, and mango, which attains the height of 100 ft., and bears a delicious fruit.—The forests abound in wild animals. They are the elephant, the one-horned rhinoceros, the tiger, leopard, wild and civet cats, wild hog, several species of deer, some of which are nearly as large as the ox, and the wild ox and buffalo, which are found in large herds. It is said that none of the ferocious members of the canine tribe are to be found in Burmah or in any countries of tropical Asia E. of Bengal. In the lower provinces elephants are very numerous, and often do great damage to the rice fields. Hares and various kinds of monkeys are found. Of birds, the wild cock is common; and there are also varieties of pheasants, partridges, and quails. Peacocks, parrots, and pigeons are very numerous in the forests of the lower provinces. Fish are plentiful in the Irrawaddy. There are many lizards and serpents. Leeches of large size are numerous. The domestic animals are the ox, the horse, and the buffalo. The elephant also is used as a draught animal. A few goats, sheep, and asses are found. Horses are used exclusively for riding, and are rarely more than 13 hands high. The ox is the beast of draught and burden in the north, the buffalo in the south.—Burmah has great natural mineral wealth, but it is little developed. There are gold mines at Bhamo, near the Chinese frontier, and auriferous sand is found in several of the rivers. Silver is obtained at Bortwen, on the confines of China, in some parts of the interior, and in the mountains bordering on Siam. The celebrated ruby mines of Burmah are 60 or 70 m. N. E. of the capital. Sapphires of large size are also found in the same place. The topaz, amethyst, and varieties of the chrysoberyl and spinelle are found in the beds of some rivulets. These are all perquisites of the crown. Iron ore is found at Poukpa, but owing to the ignorance of the workmen 80 or 40 per cent. is lost in the process of smelting. Copper, tin, lead, and antimony are known to exist in the eastern parts, but it is doubtful if any of these metals are obtained in considerable quantities. The mountains near the city of Ava furnish a superior

quality of limestone; fine statuary marble is found 40 m. from the capital, on the banks of the Irrawaddy; amber exists so plentifully that it sells in Ava at the low price of \$1 per pound; and nitre, natron, salt, and coal are extensively diffused over the entire country, though the latter is little used. On the E. bank of the Irrawaddy, about lat. 20° 30' N., are the famous petroleum wells, near a village called Renankhyaung. The wells, which are about 800 in number, occupy a space of about 16 sq. m. The country here is a series of sandy hills and ravines, sparingly dotted with stunted trees. The artificial pits are from 200 to 300 ft. deep, and the oil which bubbles up at the bottom is brought up in buckets. When taken out it is thin, but thickens after keeping and coagulates in cold weather. It has a pungent aromatic odor, and is used for lighting and for protection against insects. Turpentine is produced in various portions of the country, and is extensively exported to China.—In the valley of the Irrawaddy and adjacent hills there are four seasons distinctly marked: the cold, from November to February; the first rainy, from March to May; the hot, from June to August; and the second rainy, in September and October. The climate is generally healthy, especially in the hilly tracts. The extremes of heat and cold are seldom experienced except before the periodical rains. Heavy mists occur in November and December, but no snow falls, and only a little hail in April or the beginning of May. The transitions of the seasons are extremely sudden; the greatest heats are in March and April. Earthquakes are frequent, and often usher in and conclude the wet season. Insects are numerous, and a few weeks before the rainy season myriads of winged ants, field bugs, and other insects infest the dwellings. The Burmese, who highly relish these ants as food, lay up stores of them.—The Burmese have made but little advance in the useful arts. Women carry on the whole process of the cotton manufacture, using a rude loom, and displaying little ingenuity or skill. Porcelain is imported from China; British cottons are imported, and even in the interior undersell the native products; though the Burmese smelt iron, steel is brought from Bengal; silks and cottons are manufactured at Ava and Amarapura. While a very great variety of goods is imported, the exports are comparatively insignificant, those to China, with which the Burmese carry on their most extensive commerce, consisting of raw cotton, ornamental feathers, chiefly of the blue jay, edible swallows' nests, ivory, rhinoceros and deer's horns, and some precious stones. In return, the Burmese import wrought copper, orpiment, quicksilver, vermilion, iron pans, brass wire, tin, lead, alum, silver, gold and gold leaf, earthenware, paints, carpets, rhubarb, tea, honey, raw silk, velvets, Chinese spirits, musk, verdigris, dried fruits, paper, fans, umbrellas, shoes, and wearing apparel.

Gold and silver ornaments of a rude description are made in various parts of the country; weapons, scissors, and carpenters' tools are manufactured at Ava; idols are sculptured in considerable quantities in white marble. What mining is done is mainly carried on by the Chinese. Lead, silver, and gold, all uncoined, form the circulating medium, and have to be weighed and assayed at every change of hands. A large portion of the trade is transacted by way of barter, in consequence of the difficulties attending the making of small payments. Commerce with China and Britain is carried on mainly by means of the Irrawaddy; the minor traffic is mostly in the hands of Chinese and Armenians, who have long been settled in the capital. The standard silver of the country has generally an alloy of copper of 10 or 15 per cent. Below $\frac{1}{100}$ the mixture does not pass current, that degree of fineness being required in the money paid for taxes. The revenues proceed from a house tax, which is levied on the village, the village authorities afterward assessing householders according to their respective ability to pay. Those subject to military duty, the farmers of the royal domain, and artificers employed on the public works, are exempt. The soil is taxed according to crops. The tobacco tax is paid in money; other crops pay 5 per cent. in kind. The farmers of the royal lands pay over one half their crops. Fishing posts on lake and river are let either for a stated term or for a proportion of dried fish from the catch. These revenues are collected by officers of the crown, each of whom receives a district, from the proceeds of which he lives. The royal revenue is raised from the sale of monopolies of the crown, among which cotton is the chief. In the management of this monopoly, the inhabitants are forced to deliver certain articles at certain low prices to the crown officers, who sell them at an enormous advance. There are also certain tolls levied in particular districts. This system of taxation, though despotic, is simple in its details; and a further exemplification of simplicity in government is the manner in which the army is made to maintain itself, or at least to be supported by the people. There is no regular system of conscription, and every man is liable to serve. Nearly all are infantry armed with long spears, two-handed swords, muskets, and the *jinjal*, a kind of carbine. In the province of Padoung every soldier is quartered upon two families, who receive five acres of tax-free land, and must furnish the soldier with half the crops and 25 rupees per annum, besides wood and other minor necessities. The captain of 50 men receives 10 tikals (the tikal is worth \$1 $\frac{1}{4}$, or 2 $\frac{1}{2}$ rupees) each from six families, and half the crop of a seventh. The *bo*, or centurion, is maintained by the labor of 52 families, and the *bo-gyi*, or colonel, raises his salary from his own officers and men. The Burman soldiers fight well under able officers, but the chief excellence of

a Burman army corps lies in the absence of the *impedimenta*; the soldier carries his hammock at one end of his musket, his kettle at the other, and his provisions in a cloth about his waist.—The government of Burmah is a pure despotism, property and life lying at the mercy of the sovereign. He has the title of *boa*, or emperor. The sovereign is assisted by four *woongees*, or public ministers, four *atees*, or private councillors, four *moon dehs*, or ministers of the interior, four state secretaries, four reporters, four officers to regulate ceremonies, and nine to read petitions. Anything suggested or approved by the emperor has the force of law. The four public ministers have no distinct departments, but act wherever chance directs. They form also a high court of appeal, before whom suits are brought for final adjudication; and in their individual capacity, they have power to give judgment on cases which are not brought up to the collective council. As they retain 10 per cent. of the property in suit for the costs of the judgment, they derive very handsome incomes from this source. Justice is rarely dealt out to the people. Every officeholder is at the same time a plunderer; the judges are venal, the police powerless, robbers and thieves abound, life and property are insecure, and every inducement to progress is wanting. No person in Burmah possesses any hereditary rights except the descendants of subdued princes, who are privileged to use the insignia of royalty, as white umbrellas, &c. Any subject aspires to the highest office in the state. Near the capital the power of the king is oppressive; but it decreases with distance, so that in the more distant provinces the people elect their own governors, and pay but slight tribute to the government. The provinces bordering on China display the curious spectacle of a people living contentedly under two governments, the Chinese and Burmese taking a like part in electing the rulers of these localities. Each large city has its judicial tribunal, and townships have each a governor, who is assisted by police officers placed over the several wards. From the decision of the governor there is an appeal to the provincial governor, and from him to a higher law officer in the capital. The code of laws is derived from the "Institutes of Menu," and though it contains many salutary regulations, the aims of justice are frequently perverted through the corruption of the judges. The enslavement of a debtor in discharge of a debt is common, and females in such a case may be used as concubines. Trial by ordeal often takes place, and in criminal cases punishments have been marked by the greatest cruelty.—In physical conformation, the Burmese, like most of the race which inhabits the countries between Hindostan and China, have more of the Mongolian than of the Hindoo type. They are short, stout, well proportioned, fleshy, but active; with large cheek bones, eyes obliquely placed, brown hair

never very dark complexion, coarse, lank, black hair, abundant, and more beard than their neighbors the Siamese. The women are in general well formed, rather disposed to corpulence, and of a lighter complexion than those of Hindostan. The costume of the men differs little from that of the Chinese—a tight vest with long sleeves, and a velvet or satin robe falling to the feet; the laborers often have only short trousers. The dress of the peasantry is mostly black, yellow being a sacred color, and worn by priests only.—Several distinct



Burmese Lady and Gentleman.

tribes inhabit the Burman dominions. The Burmans or Mrammas, as they style themselves, the rulers of the country, claim to have been originally celestial beings who descended to earth, where they gradually degenerated. The Salains live between the Salween river and the Galladzet and Anapetomu mountains. The Shans, resembling the Siamese, are scattered over the E. and N. provinces. The Cassayans live chiefly in the capital. The Yoes, probably a Chinese tribe who adopted Burmese customs, live on the Irrawaddy. The Kayrens or Karens, inhabiting a hilly tract between the Salween and Sittoung, bear great enmity to the Burmans. Various Tartar tribes live in the north. The ordinary houses are made of bamboo and matting thatched with leaves or grass. Those of the priests are of a superior kind and built somewhat after the Chinese model. The temples are of different styles in different provinces. At Pagan they are heavy, broad, and surmounted by a spire; in the S. provinces they are pyramidal, and adorned with many figures of sphinxes and crocodiles. They are all richly decorated and gilt.—The language spoken by the bulk of the population is the Burmese. It belongs to the monosyllabic class

of languages, but words of several syllables have been introduced from the Pali, from which also the circular-formed writing is said to have been borrowed. The Burmese has been erroneously defined by some as a dialect of the Chinese, with which it has as little affinity as with the Sanskrit. The pronunciation often differs from the writing, the words being either abridged, or where a harsh-sounding letter stands, it is softened in pronunciation. To point out the difference between words spelled alike but having different pronunciations and meanings, there are two signs placed either under or after the word. A dot placed under the word gives it a long soft sound; two dots after the word give it a short abrupt sound. The Burmese language is characterized by its monosyllabic roots and its want of grammatical forms; yet this monosyllabism is almost lost sight of by expressing a thing by two words, one of which gives its general and the other its special meaning. There is no distinction between nouns and verbs except in the particles joined to the word. There is no inflection of words. Substantives and adjectives are formed by the aid of particles which by some have been styled affixes; these stand after the word, and between them the sign of the gender and plural (*tô*) is placed. The sign of the plural is also used in the formation of the plural of personal pronouns, which always appear in their original form, and are employed as affixes, but always stand before the verb. The plural, moods, and tenses of verbs are also formed by the aid of these particles. The passive is formed from the active by the addition of an aspiration; or the auxiliary verb *shi*, to become, is used. There have been recognized four moods, the indicative, imperative, interrogative, and gerund, and three tenses, the present, past, and future. Adverbs are formed by the repetition of the adjective. The Burmese literature is very rich. There are many translations with commentaries from the Pali. The popular language has also been considerably developed. Domestic annals and traditions are not without their importance, and there are many songs and epic poems. The temples and convents have large collections of books. The Bible was translated into Burmese by the American missionary Judson in 1835-'7.—The Burmese are Buddhists by faith, and have kept the ceremonies of their religion free from intermixture with other religions than elsewhere in India and China. They believe that the religion was introduced by Gautama, the Burmese name for Buddha. Toward the close of the last century the Burman state religion was divided by two sects, or offshoots from the ancient faith. The first of these entertained a belief similar to pantheism, believing that the godhead is diffused over and through all the world and its creatures, but that it manifests itself in its highest stages of development in the Buddhas, who appear

from time to time. The good, after death, are happy in Nirvana, a state of perfect rest, while the bad are punished by a degrading metempsychosis. The other sect rejects entirely the doctrine of the metempsychosis, and the picture worship and cloister system of the Buddhists; considers death as the portal to everlasting happiness or misery, according to the conduct of the deceased; and worships one supreme and all-creating spirit. The adherents of this sect are numerous, but they worship in secret on account of their persecution by the government. The rosary is in general use, and the Pali words expressing the transitory nature of all sublunary things are often repeated. The Burmese Buddhists avoid to some extent the picture worship practised in China, and their monks are more than usually faithful to their vows of poverty and celibacy. Their religious ministrations are confined to sermons. They live in monasteries, instruct the children, and subsist entirely on the contributions of the public. They may at any time leave their convents and resume the ordinary occupations of life.—The ancient history of the Burmese commences with a cosmology similar to that of the Hindoos. A chronological table translated into English goes as far back as 289 B. C. Prome was then the seat of government. About A. D. 94 the last king of Prome died, and a new dynasty arose and transferred the court to Pagan, which remained the capital for 12 centuries. About 1233 the Chinese invaded Burmah, and subdued Ava. About 1300 Panya became the capital, and continued so for 360 years. In 1322 arose the dynasty of Sagaing. About 1364 Panya and Sagaing were both destroyed, and the seat of government was transferred to Ava. Wars were constantly waged between the Burmese and Peguans, and in the middle of the 16th century the Burmese conquered Pegu; but the latter, supported by the Europeans, not only cast off the Burmese yoke, but invaded Burmah in 1752, captured Ava, and took prisoner Donipti, the last king of his race. Soon afterward Alompra, a village chief of ability, placed himself at the head of the malcontents, defeated the Peguans, recovered Ava, and became king and lawgiver of Burmah, and founder of the present dynasty. In 1754-'7 he conquered the Cassayans and Pegu, then Martaban and Tenasserim, and took the king of Siam prisoner. In 1771 the Siamese regained their independence, and the Chinese invaded Burmah. The Chinese were repulsed and many of the Chinese prisoners forced to settle in the country. In 1783 one of the successors of Alompra conquered Aracan, fought with Siam, and captured Mergui, Tavoy, and other districts. He also armed his troops with European weapons, organized the country to resist the encroachments of the English, and changed his residence to Amapura. Under his successor Ing-she-men (Madutchao) Ava again became the capital, and As-

sam was annexed to Burmah in 1822. At this time the war with England commenced. In 1799, 50,000 Mughs of Aracan migrated into British territory, to escape the extortions of the Burmese governor; and in 1811 they made an incursion into Burmese territory. On the king's demanding these emigrants from the English, he was met with a refusal. He next demanded the cession of several border districts of Bengal on the ground of their having originally formed parts of Ava, with the same result. In 1824 Lord Amherst, governor of India, declared war against Burmah and sent Campbell to Cachar, which had expelled its rajah, who was tributary to the king of Burmah. Campbell gained a victory at Prome (Dec. 3, 1825), and concluded a treaty of peace with the Burmese shortly after. But the ratification of the treaty not following on the part of the Burmese, Campbell renewed the war in the early part of the following year, and the treaty was ratified in a few days. The English obtained thereby the provinces of Aracan, Mergui, Tavoy, and Ye. For the wars in Pegu and its subjection to the English, see *PROG.*—See Yule's "Narrative of the Mission from the Governor General of India to the Court of Ava" (London, 1858); Winter's "Six Months in Burmah" (London, 1858); Bastiat's *Reisen in Birma in den Jahren 1861-'2*; and Williams's "Through Burmah to Western China" (London and Edinburgh, 1867).

BURMAH, British, a province of British India, comprising those portions of Burmah which the English crown has acquired by successive conquests, viz.: the states of Aracan and Tenasserim, which were ceded at the close of the Burmese war of 1824, and the intermediate state of Pegu, which became a British possession in 1852, after the second war with Burmah. They constitute a narrow strip of territory occupying about 1,000 m. of seaboard on the E. shore of the bay of Bengal and the Indian ocean, and extending southward over a part of the Malay peninsula, being included between lat. 22° 46' and about lat. 10° N. and lon. 92° and 99° E. It is bounded N. by Bengal and Burmah proper, E. by Burmah proper and Siam, S. by the lower part of the Malay peninsula and the Indian ocean, and W. by the Indian ocean and the bay of Bengal. Area, 98,881 sq. m.; pop. in 1871, 2,463,484. The three principal governmental divisions of the province, which was constituted in 1862, correspond to the three states above mentioned. The British parliamentary accounts for 1871 furnish the following particulars as to the area, districts, and population of each: Aracan (Ak-yab, Ramree, Sandoway), 23,529 sq. m., pop. 447,957; Pegu (Rangoon, Bassein, Myanounz, Prome, Toungoo), 36,454 sq. m., pop. 1,538,505; Tenasserim (Anherst, Shwé-gyeen, Tavoy, Mergui), 38,898 sq. m., pop. 482,022. Aracan, the northern portion, is for the most part a depressed valley, varying from 10 to 50 m. in width, enclosed between a low range of coast-

hills and a parallel inland chain of mountains known as the Aracan-Yoma, which attain an altitude of from 3,000 to 6,000 ft. This region extends from the Naf estuary, adjoining Chittagong in Bengal, southward to the Keintalee river on the northern border of Pegu. The soil of Aracan is alluvial. The prevailing rocks are sandstones, black gneiss, clay slates, and basalt. Iron and limestone are found in small quantities. There is a scarcity of timber. Small streams are numerous, but there is only one river of any importance, the Kuladyne, 250 m. long, and navigable one fifth of that distance for vessels of from 800 to 400 tons. Akyab, the chief town, is one of the principal ports in the province. At a point in the Aracan-Yoma range not far from the 19th parallel of N. lat., and known as "the ever visible peak," the boundary line between the British possessions and Burmah proper changes its direction and runs thence due E. about 145 m. to the Pong-loung mountains, crossing the valley of the Irrawaddy in its course and forming the northern frontier of Pegu, the middle state or division of the province. Pegu is a hilly country, with an alluvial soil, fertile and well watered, and largely covered with valuable forests. It is traversed from N. to S. by two important rivers, the Irrawaddy and the Sittoung, which flow on the opposite sides of a range of hills called the Pegu-Yoma, about 2,000 ft. high and parallel to both: The Irrawaddy flows about 240 m. through British territory, amid the richest, most productive, and most thickly populated districts in the country, but divides into two large branches before entering the sea. On the eastern branch, called the Hleing or Rangoon river, is Rangoon, the capital, with a population of 96,942; and Bassein, also an important port, is situated on the western branch. Prome, one of the principal towns in the province, lies far up the river. The valley of the Sittoung resembles that of the Irrawaddy, but is less fertile. Toun-goo, Shwé-gyeen, and Sittoung are its chief towns. Tenasserim, the southernmost state of British Burmah, is mountainous, well supplied with small streams, and rich in minerals, although tin is the only metal actually mined. The Salwen river in the north is a large stream, but not navigable further than about 100 m. inland, on account of rapids. At its mouth stands Maulmain, the capital of the ancient province. The Tenasserim river, which drains a part of the peninsula, admits of ship navigation only for a short distance. Amherst is a military station and town, with a tolerable harbor, on the gulf of Martaban. Tavoy and Mergui are small peninsular ports which carry on some trade with Rangoon. It is known that antimony, iron, coal, and gold occur in Tenasserim. The coast of the province is provided with six lighthouses.—The climate of British Burmah is warm and moist, but not generally unhealthy, except in the forest tracts during the prevalence of the S. W. monsoon. The amount of annual

rainfall varies greatly with the locality; thus at Sandoway it is 253·15 inches, while it is only 48·50 inches at Prome. The average range of the thermometer between sunrise and noon is from 76½° to 88½° F. in May, and from 65° to 80° F. in December. Rice is the principal product of the country, and the chief article of export. In 1869-'70, 1,712,030 acres of this grain were planted. In the previous year 133 acres were employed in the cultivation of indigo, 100 acres were devoted to tea culture at Akyab, and mulberries were grown upon 25 acres in Sandoway. While the cultivable area of British Burmah is 38,195 sq. m., only 3,044½ sq. m. are actually cultivated. Very few articles are manufactured for export; silks are woven at Prome, and some lacquered ware is made. The total value of the trade of the province in 1869-'70 was £10,658,688, of which sum £2,114,504 represents the inland commerce. There is regular steam communication between Rangoon, Maulmain, Akyab, and Calcutta, as well as between all the more important ports in the province. The revenue is derived from land, capitation, and excise taxes, customs, and taxes on salt, fisheries, and forest produce. In 1869-'70, the total amount collected was £1,228,550. The cultivators of the soil hold their lands directly from the government, to which they pay each a small annual rental or assessment, the rate of which ranges from 10s. in some parts of Amherst to 6d. in Sandoway. The fresh-water fisheries of the country are annually leased by the government to individuals, and yield £54,000 a year to the revenue, notwithstanding that every person is at liberty to take what fish he may require for home consumption. The government of the province is vested in a chief commissioner, who is assisted by commissioners of division and other subordinate judicial officers, to the number of 137. The administration, however, is totally without legislative power. The natives, the greater proportion of whom are Burmese and Buddhists, are in the habit of referring their disputes for determination to an arbitrator chosen from among themselves, and usually a village elder. The total number of schools in the province is 456, 182 of which receive government aid. Of those which do not receive aid fully one half are mission schools.—British Burmah has prospered greatly since its organization under the general administrative system of India. The population has at least doubled, owing to the increased immigration from Burmah proper, China, and the neighboring countries, consequent upon the establishment of a stable government, which assures permanent tranquillity. The commerce of the country exhibits an even greater increase. The absence of good roads, however, is the most serious obstacle to progress, there being but 655½ m. of road in the province in 1869, of which 124 m. were first class and 874½ m. second class. A railway between Rangoon and Prome, 166 m., is projected. At present the rivers are almost the

only commercial routes. A large trade is carried on with Upper Burmah by the Irrawaddy, on which river as many as 25,000 native boats are employed. It is also navigated by a considerable number of European steamers, one of which in 1869 reached a point above Mandalay.

BURMANN, the name of a Dutch family distinguished for learning. **I. Franciscus**, born at Leyden in 1628, died in 1679. The son of a Protestant minister who had been driven from France, he officiated as professor of theology at Utrecht, and became known by his writings, especially by his commentaries on the Old Testament. **II. Pieter**, son of the preceding, born at Utrecht, July 6, 1668, died in Leyden, March 31, 1741. He studied under Grævius and Gronovius, received his diploma of doctor at law in 1688, travelled extensively, gained distinction in his profession, and was successively professor of eloquence, history, Greek, and politics at Utrecht, and afterward at Leyden, where he was twice rector of the university, and became professor of the history of the United Provinces and of poetry, and keeper of the university library. His editions of Latin classics and of the works of George Buchanan gained for him a great reputation. He also published treatises on Roman antiquities and on the revenues of the Roman people, a dissertation on the *Jupiter Fulgurator*, the epistles of Gudian and other scholars, and a more elaborate work of the same kind, entitled *Sylloge Epistolarum* (5 vols., Leyden, 1727), which is of great usefulness from its literary anecdotes and critical disquisitions. He was frequently engaged in controversies with many of his learned contemporaries. His life was written by Dr. Johnson, who says of him that "if reputation be estimated by usefulness, he may claim a higher degree in the ranks of learning than some others of happier elocution or more vigorous imagination." In the "Dunciad," however, Burmann's name is coupled with those of several other scholars satirized by Pope. **III. Pieter**, nephew of the preceding, born in Amsterdam in October, 1713, died June 24, 1778. In 1735 he became professor of eloquence, history, and poetry at Franeker. In 1742 he was transferred to the Athenæum of Amsterdam, where he also taught Greek and officiated as librarian. He inherited the controversial disposition and also the literary tastes of his uncle, and published editions of Virgil, Aristophanes, and other classic authors, and four books of original Latin poetry.

BURMEISTER, Hermann, a German naturalist, born at Stralsund, Jan. 15, 1807. He studied medicine at Greifswald and Halle, and in 1830 went to Berlin to qualify himself to be a teacher of natural history. He was soon after appointed an instructor in the gymnasium at Cologne, and in 1842 became professor of zoölogy in the university of Halle. In 1848 he was a deputy from Halle to the national assembly of Frankfort, and afterward a representative from Liegnitz in the first Prussian chamber,

where he took his seat among the liberals. In 1850-'51 he made a scientific journey in Brazil. Upon his return to Europe he resumed his professorship at Halle, again travelled in South America from 1856 to 1860, and in 1861, after another year's stay in Halle, resigned his professorship and became director of the museum of natural history established by him at Buenos Ayres. His principal works are: *Grundriss der Naturgeschichte* (Berlin, 1833; 9th ed., 1857); *Handbuch der Naturgeschichte* (1837); *Zoologischer Handatlas* (1835-'48; 2d ed., 1858-'60); *Handbuch der Entomologie* (5 vols., 1832-'35); *Genera Insectorum* (9 parts, 1833-'46); *Die Organisation der Trilobiten* (1848); *Die Labyrinthodonten* (3 parts, 1849-'50); *Geschichte der Schöpfung* (Leipzig, 1843; 6th ed., 1856); *Geologische Bilder zur Geschichte der Erde und ihrer Bewohner* (2 vols., 1851-'3; 2d ed., 1855); *Zoonomische Briefe* (2 vols., 1856); and several works on the natural history of Brazil, &c., and his travels in South America.

BURNAP, George Washington, D. D., an American clergyman, born in Merrimack, N. H. Nov. 30, 1802, died in Philadelphia, Sept. 8, 1859. He graduated at Harvard college in 1824, and in 1828 was ordained pastor of the first Independent church in Baltimore, where Jared Sparks had preceded him, and which position he retained till his death. In 1849 he received the degree of D. D. from Harvard college. He was a voluminous writer, chiefly on the theological and controversial subjects. His principal works are: "Lectures on the Doctrines in Controversy between Unitarians and other Denominations of Christians" (1835); "Lectures on the History of Christianity" (1842); "Expository Lectures on the principal Texts of the Bible which relate to the Doctrine of the Trinity" (1845); "Lectures to Young Men on the Cultivation of the Mind," &c. (1848); "Lectures on the Sphere and Duties of Woman" (1849); "Lectures on the Doctrines of Christianity" (1850); "Christianity, its Essence and Evidence" (1855); and a life of Leonard Calvert, the first governor of Maryland, in Sparks's "American Biography."

BURNES, Sir Alexander, a British geographer and diplomatist, born at Montrose, Scotland, May 16, 1805, assassinated in Cabool, Nov. 2, 1841. His father was first cousin to Robert Burns. At the age of 16 he joined the Indian army at Bombay as cadet. He was appointed interpreter and translator in Surat, from his proficiency in Hindostanee and Persian, Dec. 25, 1822. In November, 1825, he became Persian interpreter to the army for the invasion of Sind, and in 1826 assistant to the political agent at Ootch. In 1830 he went to Lahore, the capital of the Punjab, ostensibly in charge of a present of horses from William IV. to Runjeet Singh, but really to obtain accurate knowledge of the geography of the Indus. He surveyed the mouths of that river and made a map of the lower part of its course, and followed up this mission by an expedition into

central Asia. A year was occupied on this tour through Sindh, Afghanistan, Balkh, Bokhara, and Persia. He returned to England in October, 1833, and received £800 for the first edition of his "Travels into Bokhara" (3 vols. 12mo). He was made a member of the royal Asiatic society and of the royal geographical society; the latter voting him its gold medal and a premium of 50 guineas "for the navigation of the Indus, and a journey by Balkh and Bokhara across central Asia." The French geographical society gave him its gold medal. On returning to India in 1835, he undertook a mission to Hyderabad to prevent the necessity of a war with Sindh, and obtained permission from the amirs to survey the Indus, and a pledge that the practice of robbing stranded vessels should cease. In 1836-'7 he was sent to Dost Mohammed, at Cabool, on a commercial mission; but, persuaded that this prince meditated treachery toward the Anglo-Indian government, he remonstrated, was dismissed, and retired to Simla. When it was resolved to restore Shah Shujah to the throne of Cabool, he preceded the army, in charge of the commissariat, and while so employed received the announcement of his having obtained the honor of knighthood and the brevet rank of lieutenant colonel. In September, 1839, on the restoration of Shah Shujah, he was made political resident at Cabool. In this capacity he continued until Nov. 2, 1841, when on the outbreak of the Cabool insurrection he was murdered, with his brother Lieut. Charles Burnes and others. After his death was published "Cabool" (London, 1842), in which he gave a narrative of his journey to and residence in that city in the years 1836, '37, and '38.

BURNET, a central county of Texas, bounded W. by the Colorado river, which intersects its S. W. portion, and watered by affluents of Little river, a branch of the Brazos; area, 995 sq. m.; pop. in 1870, 3,688, of whom 358 were colored. The falls of the Colorado are in this county. The surface is rocky, broken by hills, and in some parts mountainous. The soil is a rich loam. Cedar brakes cover a large part of the surface; oak and elms are also found. Various kinds of marble, from pure white to jet black, are abundant; coal, iron ore, fine limestone, and traces of gold are found. Petroleum has been discovered at the county seat. The chief productions in 1870 were 6,020 bushels of wheat, 142,900 of Indian corn, 408 bales of cotton, and 13,870 lbs. of wool. There were 2,726 horses, 8,028 milch cows, 20,865 other cattle, 5,792 sheep, and 13,847 swine. Capital, Burnet, 40 m. N. W. of Austin.

BURNET, Gilbert, a British bishop and author, born in Edinburgh, Sept. 18, 1643, died in London, March 17, 1715. He took the degree of M. A. at Aberdeen before the age of 14, studied law for a short time, but at the age of 18 was licensed to preach. His sermons from the first were extempore. He declined a

living, as being too young for such a charge. After visiting Oxford, Cambridge, and London, he travelled in the Netherlands and France. On his return in 1666 he was made a fellow of the royal society, and soon after, accepting the living of Saltoun, in East Lothian, was ordained by the bishop of Edinburgh. He remained in Saltoun for several years, and drew up a statement of the abuses practised by the Scottish bishops, avowing the authorship, for doing which Archbishop Sharpe proposed excommunication and deprivation, which, however, did not take place. In 1669 he was elected divinity professor at Glasgow, and in the same year published "A Modest and Free Conference between a Conformist and a Nonconformist." In 1671 he married Lady Margaret Kennedy, daughter of the earl of Cassilis. In 1672 he published "A Vindication of the Authority, Constitution, and Laws of the Church," a treatise much at variance with his previous opinions, being so defensive of the doctrine of passive obedience that it was highly approved at court, and obtained for him the offer of a Scottish archbishopric, which he declined. While in London in 1673 he was made chaplain to Charles II.; but soon after his name was struck off the list of royal chaplains, because he opposed the arbitrary measures of the duke of Lauderdale. He resigned his Glasgow professorship in 1674 and removed to London, where he was appointed preacher at the Rolls chapel and lecturer at St. Clement's. In 1676 he published "Memoirs of the Dukes of Hamilton," compiled from family archives at Glasgow. In 1679 he published the first volume of his "History of the Reformation," for which he received votes of thanks from both houses of parliament, and a request to complete it. The second volume appeared in 1681, when he also printed "An Account of the Life and Death of the Earl of Rochester," having attended that profligate nobleman at his own request. Dr. Johnson says, "It is a book the critic ought to read for its elegance, the philosopher for its argument, and the saint for its piety." In 1682 he published his "Life of Sir Matthew Hale" and some minor works, and wrote a private letter to Charles II., remonstrating with him on his public misgovernment and private licentiousness, and reminding him of the fate of his father. The king is said to have read the letter twice, and then thrown it into the fire, but ordered the bishopric of Chichester to be offered to the writer "if he would entirely come to his interest." The offer was declined. He attended Lord William Russell on the scaffold in 1683; was dismissed from his Rolls preacher-ship and St. Clement's lectureship, by order of the king; and on the death of Charles II., early in 1685, retired to the continent. He travelled through the south of France, Italy, Switzerland, and the north of Germany, to Holland, and subsequently published an account of his journey. Visiting the Hague on the invitation of the prince and princess of

Orange in 1686, he so actively took part in the preparations for a change of rulers in England, that James II. ordered him to be prosecuted for high treason and demanded his person from the states general, but without effect, as, by taking as his second wife a Dutch lady of great wealth, named Scott, he had previously acquired the rights of naturalization in Holland. Burnet accompanied William to England in 1688 as his chaplain, and was soon after made bishop of Salisbury. In the house of lords Bishop Burnet declared himself in favor of moderate measures toward nonjuring divines, and for the toleration of Protestant dissenters. He acted as chairman of the committee to whom the bill of rights was referred. In 1689 he preached the coronation sermon of William and Mary. Soon after his installation in Salisbury, he addressed to the clergy of his diocese a pastoral letter, in which was a paragraph capable of being taken as a declaration that the title of William and Mary to the crown might be grounded on the right of conquest. Three years afterward, in January, 1693, the house of commons ordered the letter to be burned by the common hangman. In 1694 he preached the funeral sermon of Archbishop Tillotson; in 1695 he published "An Essay on the Character of Queen Mary;" in 1696, "A Vindication of Archbishop Tillotson." In 1698 he became tutor to the young duke of Gloucester, son of the princess Anne, and in the same year (having lost his second wife) married Mrs. Berkeley, a rich widow, the authoress of a "Method of Devotion." In 1699 appeared his celebrated "Exposition of the Thirty-nine Articles of the Church of England;" in 1710, his "Church Catechism Explained;" and in 1714, the third volume of his "History of the Reformation," the introduction to which had appeared separately in 1712. He died of a pleuritic fever. He left three sons, one of whom (Thomas, afterward one of the judges of the common pleas) published a biography of his father, prefixed to a "History of his Own Times, from the Restoration of King Charles II. to the Conclusion of the Treaty of Peace in the Reign of Queen Anne." This, the most remarkable of Bishop Burnet's numerous works, was greatly ridiculed by Dean Swift, Arbuthnot, and Pope. "Memoirs of P. P., Clerk of this Parish," by Pope, is now the best known of these squibs. Bishop Burnet's published works embrace 58 sermons, 13 discourses and tracts in divinity, 18 tracts against popery, 26 polemical, political, and miscellaneous tracts, and 25 historical works and tracts. Macaulay, in the second volume of his "History of England," has vindicated the character of Burnet for integrity and ability.

BURNET, James. See MONBODDO.

BURNET, John, a Scottish engraver and painter, born at Fisher Row, near Edinburgh, March 20, 1784, died April 29, 1868. He learned etching and engraving during seven years' apprenticeship in Edinburgh, and was a student in

drawing and painting at the trustees' academy. In 1806 he went to London, where he engraved Wilkie's "Jew's Harp," "Blind Fiddler," "Rent Day," "Rabbit on the Wall," "Chelsea Pensioners Reading the Gazette of the Battle of Waterloo," "Letter of Introduction," "Death of Tippoo Saib," and "Village School." He also engraved plates from several recent painters, from the Rembrandts in the national gallery, and from some of his own paintings. He published several illustrated works and manuals for artists, "Rembrandt and his Works," "Life and Works of J. M. W. Turner" (with P. Cunningham), &c.

BURNET, Thomas, an English author, born at Croft, Yorkshire, about 1685, died at the Charterhouse, London, in September, 1715. As master of the Charterhouse school, he was the first Englishman to oppose the dispensing power claimed by James II. By the constitution of the Charterhouse the pensioners must take certain oaths of allegiance and supremacy. James sent down a candidate, Andrew Popham, for election to the charity, accompanying his mandate with a dispensation from the usual oaths, Popham being a Roman Catholic. Burnet at once denied the king's dispensing power, and refused to receive Popham. In this he was supported by his patron the duke of Ormond, and the candidate was rejected. After the revolution Burnet was made clerk of the closet to William III., on the recommendation of Archbishop Tillotson. He lost the court favor and his hopes of preferment by the publication, in 1692, of *Archæologia Philosophica Libri duo*, in which he treated the Mosaic account of the fall as allegorical. His principal works were written in Latin, of which the *Telleri Theoria Sacra* (translated into English, "Sacred Theory of the Earth," 2 vols. 8vo, 1759) attained a high reputation.

BURNETT, a N. W. county of Wisconsin, separated on the W. and N. W. from Minnesota by the St. Croix river, and watered by its affluents; area, 1,100 sq. m.; pop. in 1870, 706. It contains many small lakes. The chief productions in 1870 were 2,553 bushels of wheat, 1,840 of oats, 1,955 of potatoes, and 1,655 tons of hay. Capital, Gordon.

BURNETT, Waldo Irving, an American naturalist and microscopist, born in Southborough, Mass., July 12, 1828, died in Boston, July 1, 1854. In early boyhood he began the study of entomology, which he continued through life. His father was a physician, and under his guidance he commenced the study of medicine, graduated in 1849, and soon after visited Europe, where his attention was given almost exclusively to natural history and microscopic observation. During the last five years of his life, though suffering from consumption, he accomplished an almost incredible amount of intellectual labor, the results of which may be found in the "Proceedings" and "Journal" of the Boston society of natural history, in the "Memoirs of the American Academy of Arts

and Sciences," in the "American Journal of Science," in the "Transactions of the American Medical Association for 1853," and in the "American Journal of Medical Science." His principal work was the prize essay published by the medical association on "The Cell, its Physiology, Pathology, and Philosophy, as deduced from Original Observations; to which is added its History and Criticism." He was engaged at the time of his death in translating from the German the "Comparative Anatomy" of Siebold and Stannius.

BURNEY, Charles, an English organist, composer, and historian of music, born at Shrewsbury, April 7, 1726, died at Chelsea, April 15, 1814. At the age of 18 he came under the tuition of Dr. Arne, with whom he studied for three years in London. In 1749 he was appointed organist of a church in the city, and in the same year produced at Drury Lane three musical dramas, "Robin Hood," "Alfred," and "Queen Mab." For the next nine years he lived at Lynn Regis, in Norfolk, as organist, and compiled materials for his "History of Music." In 1760 he returned to London, where he brought out a number of instrumental compositions, and an adaptation of J. J. Rousseau's operetta, *Le devin du village*, under the title of "The Cunning Man." One of his most admired works was an anthem performed on the occasion of receiving his degree of doctor of music at Oxford in 1769. In the following year, with a view of obtaining further materials for his "History of Music," he visited the principal cities of France and Italy, and in 1771 published the result of his observations in a volume entitled "The Present State of Music in France and Italy." In the succeeding year he made a similar tour through Germany and the Netherlands, and published the result in two volumes. The four volumes of his "History of Music" appeared respectively in 1776, 1782, and two in 1789. His remaining works are: "An Account of Little Crotch, the Infant musician," "An Account of the Musical Performances in Westminster and the Pantheon a commemoration of Handel," a life of Metastasio, and the musical articles in "Rees's Cyclopædia." His published compositions are chiefly sonatas. In 1790 he was appointed organist of Chelsea college, where he passed the remainder of his life.—Dr. Burney was twice married, and had eight children, of whom the eldest created a sensation in London in her youth by her performances on the harpsichord. The second daughter was Frances, Mme. d'Arley, the novelist. (See ARLEY.) Another daughter, SARAH HARRIET, also wrote several novels ("Geraldine Fauconberg," "The Shipwreck," "Traits of Nature," &c.), but with less success. The eldest son, JAMES (1739–821), was an officer in the navy, accompanied Capt. Cook in two voyages, commanded the discovery after Cook's death, and became rear admiral. He was the author of a "Chronological History of the Discoveries in the South

Sea, with a History of the Buccaneers of America" (5 vols. 4to, 1803–17), and other works. **CHARLES, D. D.** (1757–1817), was an eminent classical scholar, critic, teacher, and bibliographer. He collected a valuable library, which is now in the British museum.

BURNING GLASS and **BURNING MIRROR**, instruments to concentrate the sun's heat. The usual burning glass is simply a double convex lens, which brings the rays of solar heat to a focus at nearly the same point at which it brings the rays of light. Artificial heat cannot in general be brought to a focus by a glass lens; but a lens of rock salt will bring heat radiating from any source to a focus. The use of burning glasses or burning crystal is alluded to by Aristophanes, and several writers declare that Archimedes fired the Roman ships by means of burning mirrors. In the 17th and 18th centuries many experiments were made with burning glasses of immense size. Tschirnhausen made several, some of which are still at Paris, 33 in. in diameter. In 1774 Lavoisier and Brisson superintended the making of a lens 4 ft. in diameter, of two glasses like watch crystals, with various fluids between. This is called Trudaine's lens, from the person who bore the expense. About the year 1800 a Mr. Parker of London made a lens 3 ft. in diameter, which is now at Peking. The heat from these large lenses is intense, and capable of melting any stone or mineral in a few seconds. Equal effects may be obtained from mirrors. Heat is reflected like light, and a concave mirror brings both to a focus. About 1670 a M. Vilette of Lyons constructed several mirrors of polished metal, from 30 to 50 in. in diameter. Tschirnhausen made one of copper nearly 5 ft. in diameter. Buffon (who was the first to suggest a lens made of several pieces, afterward brought to perfection by Fresnel, and of great use in lighthouses) made a large reflector of several hundred smaller ones, each 6 in. by 8. With this he set fire to wood at the distance of 210 ft., proving the possibility, though not the probability, of Archimedes having thus burned the Roman fleet. It having been shown that the sun's rays have a heating power partly proportioned to the heat of the place into which they shine, the galvanic flame of a large battery has been made to play through the focus of a large burning glass, and thus the most intense heat ever witnessed has been produced, beyond all reasonable comparison with those temperatures that can be measured by degrees. In all these experiments the most blinding light accompanies the heat, which renders it somewhat difficult to observe the effects. Priestley's "History of Optics," Bossut's *Histoire des mathématiques*, the *Mémoires* of the French academy for 1777, and Buffon's supplement to his "Natural History," give further information on this subject.

BURNLEY, a town of Lancashire, England, on the river Burn, 22 m. N. of Manchester, and 40 m. N. E. of Liverpool; pop. in 1871, 31,608. It is on the Leeds and Liverpool ca-

nal, and is connected by railway with London. Although near the site of a Roman camp, Burnley is a comparatively modern place, the population in 1801 having been only 3,305. Its charter dates from 1861; and since 1869 it has been a parliamentary borough, returning one member to the house of commons. Its prosperity is mainly due to the abundance of coal in the vicinity. It contains about 30 cotton mills, the principal production being cheap prints. There are also machine works, iron founderies, corn mills, breweries, tanneries, and ropewalks, two weekly markets and six annual fairs. In the Roman Catholic chapel of the Virgin Mary is a monument to Charles Townley, whose collection of marbles and bronzes was purchased for the British museum. The free grammar school, founded in the 17th century, has a valuable library; the mechanics' institute has a good reading room; the church of England institute has a large library; and a new market hall was opened in 1868.

BURNOUF. I. Eugène, a French orientalist, born in Paris, Aug. 12, 1801, died there, May 28, 1852. He was the son of a distinguished philologist, Jean Louis Burnouf (1775-1844), inspector and librarian of the university of Paris, and author of standard Greek and Latin grammars, a translation of Tacitus, &c. Eugène early began the study of the oriental languages under Chézy and Abel Rémusat, and soon attained distinction. In 1826 he published his *Essai sur le Pali ou langue sacrée de la presqu'île au delà du Gange*, and in the following year *Observations grammaticales sur quelques passages de l'essai sur le Pali*. The work which placed him in the front rank of orientalists was the restoration of the Zend language, which he was enabled to achieve by the aid of the Sanskrit. He undertook to decipher the Zend manuscripts which had been brought from the East by Anquetil-Duperron, and caused the *Vendidad-Sade*, one of the books of Zoroaster, to be lithographed and published from time to time in the *Journal Asiatique*. In 1832 he was made a member of the academy of inscriptions, and the same year succeeded Chézy as professor of Sanskrit in the college of France. In 1835 appeared the first volume of *Commentaires sur le Yagna, l'un des livres liturgiques des Perses*, a work which rendered possible for the first time a knowledge of the language and dogmas of Zoroaster. This was followed in 1836 by his *Mémoire sur deux inscriptions cunéiformes*, in which he attempted to decipher the cuneiform inscriptions of Persepolis. In 1840-'44 he published the Sanskrit text with French translation of the *Bhāgavat-Purāna, ou Histoire poétique de Krichna*. His great work, *Introduction à l'histoire du Bouddhisme indien*, appeared in 1845. His last work was a translation from the Sanskrit, with a commentary, of one of the fundamental books of Buddhism, *Le lotus de la bonne loi*, which was published shortly after his death. A few days before his death he was appointed perpetual secretary of the acad-

emy of inscriptions. **II. Émile Louis**, a French scholar, cousin of the preceding, born at Volognes, Aug. 25, 1821. He studied in the French school at Athens and at the normal school at Paris, and in 1854 became professor of ancient literature in the faculty of Nancy, and subsequently director of the French school at Athens. He has published *Des principes de l'art d'après la méthode et les doctrines de Platon* (1850); *Le Neptune ejusque Cultu, præsertim in Peloponneso* (1850); *Extraits du Novum Organum de Bacon* (1854); in conjunction with M. Lequel *Méthode pour étudier la langue sanscrite sur le plan des Méthodes de J. L. Burnouf* (1859); *Essai sur le Veda, ou introduction à la connaissance de l'Inde* (1863); *Dictionnaire classique sanscrit-français* (1863-'5); and *La légende athénienne* (1878); besides a number of still uncollected contributions to the *Revue des Deux Mondes* and other periodicals.

BURNS, Robert, a Scottish poet, born near Ayr, Jan. 25, 1759, died at Dumfries, July 21, 1796. His parents were peasants of the poorest class, but eager for the moral and intellectual improvement of their children, and lost no opportunity for supplying them with the rudiments of education. Robert, in the intervals of driving the plough and other farm work, soon acquired a knowledge of English. His chief books were the Bible, Mason's "Collection of Prose and Verse," the "Life of Hannibal," and the history of Sir William Wallace. Later in life he attempted to learn French and Latin, without much success; he also eagerly read the "Spectator," Shakespeare, Pope, and particularly the poems of Allan Ramsay. His first attempt in verse was made in his 16th year. "A bonnie, sweet, sonesie lass," as he says in a letter to Moore, "who was coupled with him in the labors of the hay harvest," awoke his early inspiration. Robert and his brother Gilbert were employed by their father as regular day laborers, at £1 per annum, until Robert's 19th year, when he went to the school of Kirkoswald to learn mensuration and surveying. During this time he wrote and had printed "The Dirge of Winter," "The Death of Poor Maillie," "Maillie's Elegy," and "John Barleycorn," in which he manifested that deep fountain of pathos and humor which afterward rendered him famous. In 1781 he removed to Irvine to learn the trade of flax dresser, in which, however, he did not make much progress. In 1783, a short time before the death of his father, he and his brother took a farm at Mossgiel, with a view of providing shelter for their parents. In the midst of his distresses he wrote several satirical pieces, such as "The Holy Fair," "Holy Willie's Prayer," "The Ordination," "The Holy Fair," and others, chiefly leveled at the churchmen, which won him a wide local reputation. To his residence at Mossgiel are also to be referred the verses "To a Mouse," "To a Mountain Daisy," "Man was made to mourn," and that sweetest of pastoral

als, "The Cotter's Saturday Night;" besides innumerable love songs, some of them the finest in the language, none of which, he says, related to imaginary heroines. His want of success on the farm suggested to him the project of going to Jamaica, and to enable him to do this he proposed to publish a collection of his writings. Another motive was probably his *liaison* with Jean Armour. She had borne him twins, and he had given her a written acknowledgment of marriage, good in Scotch law; but, being unable to support a family, he had been prosecuted by her relatives. Accordingly, in the autumn of 1786, he issued 600 copies of his poems at Kilmarnock, from which he derived £20, enough to enable him to procure a passage in a ship about to sail from the Clyde. His chest was on the road to Greenock, and he had written "The gloomy night is gathering fast," as a kind of farewell to Scotland, when a letter from Dr. Blacklock to a friend of his arrested the execution of his purpose. This letter recommended a visit to Edinburgh, with a view to receive the applause which his poems had excited, and to arrange for the issue of a new edition. Burns went to the metropolis, and for more than a year was admired, flattered, and flattered by persons of all ranks. He returned home with £500, the profits of the publication; of this he gave £200 to his brother, and with the remainder stocked a farm at Ellisland, in Dumfriesshire, where he took up his residence in 1788, and married Jean Armour. He was also appointed a collector of excise with a salary of £50, which was afterwards raised to £70; but the duties of the place, together with his convivial habits, interfered so much with the labors of the farm, that the latter yielded him little or nothing, and he was compelled to surrender it to the landlord. Toward the close of 1791 he retired to a small house in the town of Dumfries, where he supported himself and his family on his official stipend, and by random contributions to Johnson's "Museum" and Thomson's "Collection of Original Scottish Airs." But intemperance, exposure, and the disappointment of his hopes of promotion undermined his constitution, and he died in his 37th year. During his last illness his dwelling was hronged by persons of every rank, and his funeral was attended by a great multitude. In 1813 a monument was erected to his memory at Dumfries. The centenary of his birthday, in 1859, was celebrated in almost every village of Scotland, in England, the United States, the British colonies, and India; the anniversary of his birth is commemorated by Scotsmen all over the world.—He left four sons, of whom two entered the service of the East India company. Of these, ROBERT, who was an accomplished Gaelic scholar, and not without poetical ability, born in 1786, died at Dumfries, May 4, 1857; and WILLIAM, born in 1790, died at Dheltenham, England, in 1872. The latter, who rose to the rank of colonel in the service,

purchased the house in which his father died, and where his mother resided until her death in 1884. He also executed a deed leaving the house, garden, and a building to be used as a school room, to the Dumfries education society, upon condition of the payment of an annuity to the nieces and grand-nephew of the poet during their lifetime, and that the house should thereafter be kept in repair.—The poetry of Burns appeals to the deepest and purest emotions of the human heart. It is so fraught with passion, so instinct with melody, so true to nature, so artless in grace, that every one must be touched either by its pathos, its beauty, or its mirth. He had "an inspiration for every fancy, a music for every mood." In the simple, the naive, the sweet, he is scarcely more distinguished than he is in the grotesque, the wild, and even the terrible. His "Tam o' Shanter" displays narrative ability of the first order, while his "Jolly Beggars" is filled with dramatic power. But his peculiar strength was lyrical. Of the poems of Burns, a third edition was published in 1793, a fourth in 1798. Dr. Currie of Liverpool published a collected edition of his poems and letters for the benefit of his family (4 vols., London, 1800); and Allan Cunningham edited a more complete edition (8 vols., London, 1834). His biography has been written by Lockhart (Edinburgh, 1828). In the "Life and Works of Burns," by Robert Chambers (2 vols., Edinburgh, 1851-'2), the poems are incorporated and arranged in chronological order.

BURNS AND SCALDS. Burns are produced by heated solids, or by the flames of some combustible substance, solid, liquid, or gaseous; scalds are produced by heated steam or liquid. The worst burns which occur commonly arise from the explosion of gunpowder or inflammable gases, or from the dresses of children or of females catching fire; the worst scalds, from accidents in breweries, manufactories, laboratories, and steamboats. The severity of the accident depends mainly on the intensity of the heat of the burning body, together with the extent of surface and the vitality of the parts involved in the injury. The immediate effect of scalds is generally less violent than that of burns. Fluids, not being capable of acquiring so high a degree of temperature as some solids, cannot act with the same violence on a given point; but, flowing about with great facility, their effects often become more serious by extending to a very large surface of the body. A burn which utterly and instantaneously destroys the part it touches may be free from dangerous complications if the injured part be circumscribed within a small compass; while a scald apparently much less severe in its immediate effects, being more or less diffused, is always attended with different degrees of injury in different parts of its course, and may be very serious in its results, although apparently less violent in its first effects on any given part. The extent of the surface involved, the depth

of the injury, the vitality and the sensibility of the parts affected, must all be duly weighed in estimating the severity and the danger of an accident in any given case of burn or scald. In ordinary burns and scalds the immediate seat of injury is the skin or the external surface, one of the most vital parts of the frame. The skin is a highly organized membrane, endowed with acute sensibility. Burns and scalds, therefore, are more dangerous in proportion to the amount of surface involved than in proportion to the depths attained in a limited extent, for the outer layers are the most highly organized and sensitive parts of the cutaneous system. The outermost of all, however, the epidermis, being a mere coat of horny varnish, is the least sensitive; and where the injury is slight and altogether superficial, though extensive, the mischief is but trifling at first, and may be easily remedied; although unpleasant complications may ensue if the superficial injury is neglected, and the parts beneath are long exposed to the action of the air, which causes irritation, pain, and inflammation. When the injury to the skin is so serious and extensive as to arrest the physiological action of this organ over a great part of its surface, this fact alone is usually sufficient to produce a fatal result. The suffering and shock to the nervous system, when sensibility has not been completely deadened, combine to make the condition of the patient after severe burns or scalds almost hopeless; but the worst cases might often be avoided by a little knowledge and self-possession on the part of the sufferer at the time of the accident, and a fatal contingency be transformed into a temporary injury.—Where the body is enveloped in flames, from the clothes being on fire, the first thing to be done is to lie down on the floor and roll the carpet or a rug, or any cloth or garment, closely round the body, so as to exclude the air from the burning dress, and thus put out the flame. Or, lie down at once and roll the body over the burning clothes, calling to some one near to throw a blanket or a cloth of any sort, wet or dry, or water, over you as you lie on the floor, stifling the burning clothes between your body and the ground. If the clothes of a child or a grown person near you should take fire, pursue the same method. The upright position is the worst, being favorable to the spread of the flames, and allowing them to reach the upper and most vital portions of the body, trunk, head, face, and neck. Fright causes children to run to and fro for help, and this increases the currents of surrounding air, and helps the flame to spread. Merely hugging the child rapidly and closely in your arms, and rolling slowly on the floor with it, enveloping the flaming part with any portion of your own dress, will stifle out the air and flame together. Presence of mind alone suffices. In every case, and under all conditions, the main thing to be done at first is to stifle the flames by shutting out the air.—When the accident has happened,

the burned or scalded parts should be immersed at once in cold water, or enveloped in wet cloths, or in dry cotton, or in flour, bran, or oiled muslin, or anything which is convenient to keep out the air from the injured surface of the skin. Immersion in cold water is the best, where it is practicable; because it not only shuts off the air, but causes a rapid rush of temperature from the injured tissues to the cold water, analogous to the violent rush of heat from the burning or scalding medium to the skin in the first instance, though in an opposite direction; and this inverse action soothes the nerves of sense, and thus answers the first requirement by diminishing the shock to the whole system from intensity of pain. Some persons recommend stimulating lotions of brandy or spirits of wine, oil of turpentine or vinegar, kept on the injured parts by means of lint, cotton, or old linen soaked in the liquid; others prefer soap and water, with or without creosote; and much difference of opinion exists with regard to the best means. An oil-skin, a soapy film, a coat of simple ointment, of cotton wool, or of flour, or anything which will exclude the air and not irritate the injured parts, will serve the purpose very well; and all the theories about peculiar modes of action in the various stimulating substances are more or less it would appear, imaginary adjuncts to the simple fact of keeping out the air. When the pain has been arrested by the action of cold water, a delicate soap-and-water film upon the injured parts, surrounded by an oil-skin, or a layer of cotton wool, and bandaged carefully to keep the application in its place, are all that is required in ordinary cases of burns and scalds, until medical assistance is procured.

BURNSIDE, Ambrose Everett, an American soldier, born at Liberty, Ind., May 23, 1824. He graduated at West Point in 1847, was stationed at Fort Adams, Newport, R. I., and subsequently sent to New Mexico, where he commanded a squadron of cavalry, and acted as quartermaster in the boundary commission, 1851-2. Having invented a breech-loading rifle, he resigned his commission in 1854, and established a manufactory for its fabrication in Rhode Island. This proving unsuccessful, he became treasurer of the Illinois Central railroad, at its office in New York. In 1861 he was appointed colonel of the 1st regiment of Rhode Island volunteers, which marched to Washington four days after the issuing of the call by the president. He commanded a brigade at the battle of Bull Run, after which he was made brigadier general. In January, 1862, he was placed in command of an expedition to North Carolina, and captured Roanoke Island, New Berne, and Beaufort. He was recalled at the close of the campaign on the peninsula, and ordered to Fredericksburg, where he remained until after the defeat of Pope at the second battle of Bull Run. During the confederate invasion of Maryland Burnside was placed under the command of McClellan, gained the bat-

tle of South Mountain, Sept. 14, 1862, commanded the left wing at Antietam, and afterward one of the three corps into which the Union army was divided. On Nov. 7 he superseded McClellan in the command of the army of the Potomac. He moved from the Rapidan to Fredericksburg on the Rappahannock, intending to cross the river at that point and move upon Richmond; but before he was prepared to cross, Gen. Lee had taken possession of the heights on the opposite bank. Burnside crossed Dec. 12, and on the next day endeavored to force the confederate lines. His repeated attacks, however, were all repulsed, and in the engagement the Union loss was 1,152 killed, 9,101 wounded, 3,284 missing—13,487 in all; the confederate loss was 595 killed, 4,061 wounded, 653 missing—5,309 in all. Several officers of high rank severely criticised his measures, and he asked that they should be removed, tendering his resignation of the command in case they were not. His resignation was accepted, and he was succeeded by Gen. Hooker, Jan. 26, 1863. In May he was assigned to the command of the department of the Ohio, taking with him two divisions of the 9th corps, and soon afterward arrested C. L. Vallandigham for expressing disloyal sentiments. Early in June the 9th corps was detached from Burnside's command, and sent to aid Gen. Grant at Vicksburg. During this absence occurred Morgan's raid, after which Burnside undertook to free East Tennessee from the confederates. In this he was successful, and received the thanks of congress. Late in September the 9th corps was restored to the command of Burnside. Gen. Lee had in the mean while sent Longstreet to Tennessee with a strong force from Virginia. Burnside fell back to Knoxville, where he was besieged till the beginning of December, when the siege was abandoned on the approach of Sherman with a detachment from Grant's army. Burnside was then relieved from the command in the west, and in January, 1864, again placed in command of the 9th corps, to which a division of colored troops was attached. The original design was to send this corps to North Carolina; but Grant, now in chief command, required it in Virginia. Grant having crossed the Rapidan on May 4, the 9th corps followed the next day, and took part in the battles of the Wilderness, Spottsylvania, and the North Anna, May 6-25. The corps was now attached to the army of the Potomac, and placed under the immediate command of Gen. Meade, Burnside waiving his seniority in rank. In the subsequent operations, down to the siege of Petersburg, the corps bore a prominent part. During the early part of the siege Burnside's lines were close to those of the enemy, and opposite them was a strong redoubt, forming an important part of the confederate defence. Burnside undertook to blow up this work by running a mine beneath it. This was completed in a month, and was exploded on June 30. The redoubt was

blown up, but the general assault which was to follow the explosion was not made, and the effort proved a total failure. Burnside proffered his resignation, which the president refused to accept, but gave him leave of absence. He was not again called into active service, and resigned April 15, 1865. In 1866 he was elected governor of Rhode Island, and reelected in the two following years. Since 1869 he has been engaged in business. In the autumn of 1870, being in Europe, he was admitted within the German and French lines in and around Paris, and ineffectually endeavored to mediate between the belligerents.

BURROW, Julie, a German novelist, born at Kydullen, Prussia, Feb. 24, 1806, died in Bromberg, Feb. 19, 1868. She was educated in Elbing, removed to Dantzic in 1823, and in 1830 married the architect Pfannenschmidt. Her first novel, *Frauenloos* (3 vols., Königsberg, 1850), was followed by *Aus dem Leben eines Glücklichen* (3 vols., 1852). Among her later works are *Johannes Kepler* (3 vols., Prague, 1857-'65), and *Die Preussen in Prag* (1867). She also wrote poetry and on the education of women and children, and in 1857 published her autobiography.

BURR. I. Aaron, an American clergyman and educator, born in Fairfield, Conn., Jan. 4, 1716, died Sept. 24, 1757. In 1738 he became pastor of the Presbyterian church in Newark, N. J., and in 1748 the second president of the college of New Jersey in that place (afterward removed to Princeton), of which he was one of the principal founders. He was succeeded in this office by Jonathan Edwards, his father-in-law. He published "The Supreme Deity of our Lord Jesus Christ Maintained" (new ed., 1791), several sermons, and a Latin grammar (1752). **II. Aaron**, an American soldier and politician, third vice president of the United States, son of the preceding, born at Newark, N. J., Feb. 6, 1756, died on Staten Island, N. Y., Sept. 14, 1836. Both his parents died before he was three years old, leaving him a considerable estate. He graduated at Princeton college in 1772, entered the army as a private, accompanied Arnold in the expedition to Canada, and was present at the attack upon Quebec. For his services in this campaign he was made major, and invited to join the military family of Washington. Some event soon occurred which compelled Burr to leave headquarters, and produced in the mind of Washington an impression against him which was never removed. As aide-de-camp to Gen. Putnam, Burr was engaged in the defence of New York, and in 1777 he was made lieutenant colonel, with the command of his regiment. He was in the camp at Valley Forge, and distinguished himself at the battle of Monmouth, where he commanded a brigade. During the winter of 1778 and 1779 he was stationed in Westchester county, N. Y., and for a short time was in command at West Point. Early in the follow-

ing spring he resigned his commission. Burr belonged to the Lee and Gates faction, and affected to despise the military talents of Washington. In 1782 he was admitted to the bar at Albany, and in July of the same year he married Mrs. Prevost, the widow of a British officer who had died in the West Indies. In 1783 he entered upon the practice of his profession in the city of New York. He was elected to the state legislature in 1784, appointed attorney general of New York in 1789, and chosen United States senator in 1791. While in the senate he was recommended for the mission to France, but Washington refused to appoint him. He left the senate in 1797, and the following year was returned to the state legislature. He was active in the presidential canvass of 1800, and to his efforts may be attributed the success of the republicans in New York, upon the action of which state the result in the Union depended. On account of the prominence he thus obtained, the friends of Mr. Jefferson brought him forward for the vice-presidency. An equal number of votes having been cast for Jefferson and Burr in the electoral college, the election of a president devolved upon the house of representatives, most of the federal members voting for Burr. Jefferson was elected president, after a contest of several days, and, in accordance with the provisions of the constitution at that time, Burr became vice president. His conduct in permitting himself to be used by his political opponents in order to defeat the candidate of his party, and whom he himself had supported, dissolved his connection with the republicans, and destroyed his political influence. The federalists nominated him for governor of New York in 1804. Some of the leading men of that party refused to support him, and he was defeated. The contest was bitter, and led to a duel between Burr and Alexander Hamilton, July 11, 1804, in which the latter was killed. Burr was disfranchised by the laws of New York for having fought a duel, and was indicted for murder in New Jersey. His term as vice president closed March 4, 1805, and in April he set out upon a journey through the western country. What were his real schemes is uncertain; probably they were not definitely formed in his own mind; but they seem to have included the formation of a new government in the south on the borders of, and perhaps partly within, the United States. He purchased 400,000 acres on the Red river, and gave his adherents to understand that the Spanish dominions were to be conquered. His proceedings excited alarm, and on Nov. 27, 1806, President Jefferson issued a proclamation against him. While endeavoring to make his way to the coast, he was arrested in Alabama, Feb. 19, 1807, and brought to Richmond, Va., for trial upon an indictment for high treason. The trial began March 27, and lasted until Sept. 7. No overt act of treason could be proved, and the jury brought in the

verdict, "Aaron Burr is not proved to be guilty under the indictment by any evidence submitted to us." He was accordingly set at liberty, and in 1808 went to Europe, hoping to obtain means to effect his designs, which had now taken the form of an attempt upon Mexico. He was disappointed, and after living abroad for some years, a part of the time in great poverty, he returned to America in 1812, and resumed the practice of his profession in New York, but never regained his position at the bar. In his 78th year he married Madame Jumel, a wealthy widow, but was soon divorced, and died neglected three years afterward. In person Burr was below the medium stature; his manners and appearance were very attractive, but his principles were loose and his habits licentious. He was an adroit lawyer and effective speaker. He had but one legitimate child, Theodosia, the wife of Gov. Allston of South Carolina, who was lost at sea in January, 1813.—See "Life of Aaron Burr," by Samuel L. Knapp (New York, 1835); "Memoirs, with Selections from his Correspondence" (2 vols., 1837-'8), and "Private Journal" during his residence abroad, with selections from his correspondence (2 vols., 1838), both edited by Matthew L. Davis; and "Life and Times of Aaron Burr," by James Parton (1858).

BURRAMPOOR, or *Burhanpur*, a town of British India, presidency of Madras, in the Northern Circars, 10 m. S. W. of Ganjam; pop. estimated at 20,000. Situated a few miles from the W. shore of the bay of Bengal, in a cultivated plain shut in by lofty hills and abounding in perennial springs, it is a favorite resort for the government officials of Ganjam during the unhealthy months of the wet season. The weather from October to February is clear, cool, and healthy, the thermometer ranging from 50° to 75°. In April and May fevers and rheumatism prevail; in June the S. W. monsoon commences, and is succeeded by the N. E. in September. The soil of the vicinity of the town is dry and sandy. The streets resemble those of most Indian towns, being narrow, dirty, and lined with badly built mud houses. There are a few brick buildings, many Hindoo temples, and well stocked bazaars. Sugar and sugar candy are manufactured in large quantities, and silk and cotton are produced to some extent.

BURRAMPOOTER. See **BRAHMAPOOTRA**.

BURRHUS, or *Burrus*, *Afranius*, a Roman commander, died A. D. 62. He acquired great popularity, and Claudius, at the suggestion of Agrippina, appointed him in 52 sole prefect of the prætorians, which enabled him after the death of that emperor to promote Nero's elevation to the throne. With Seneca he succeeded for some time in restraining the excesses of Nero, opposed the murderous designs of Agrippina, and subsequently refused to become Nero's accomplice in her assassination and in that of Octavia. Nero is generally believed to have had

him poisoned; but according to some authorities, Burrhus ordered his soldiers to congratulate Nero upon the consummation of his matricide, shared in the spoils of Britannicus, and died a natural death.

BURRILL, James, an American jurist, born in Providence, R. I., April 25, 1772, died in Washington, Dec. 25, 1820. He graduated at Rhode Island college (now Brown university) in 1788, and in 1791 began the practice of the law. In 1797 he was elected attorney general of Rhode Island, and held the office till 1818, when the state of his health compelled him to resign. He became chief justice of the state in 1816, and in 1817 was elected senator in congress, and died before the expiration of his term. In the senate he was distinguished as an opponent of the Missouri compromise.

BURRITT, Elihu, an American scholar and reformer, born in New Britain, Conn., Dec. 5, 1810. The son of a shoemaker, he was educated in the common schools of his native village, and at the age of 17 was apprenticed to a blacksmith. A desire to read the Scriptures in the original led him to philological studies in the intervals of labor, and he soon mastered several languages. He removed to Worcester, Mass., to have the advantage of the library of the antiquarian society there, and while still following his trade studied the principal ancient and modern languages, and became known as "the learned blacksmith." In 1844 he edited at Worcester the "Christian Citizen," a paper advocating a peaceful settlement of international difficulties. To the same end he delivered many public lectures. He was also prominent as an advocate of temperance and of slavery abolition, and later of cheap ocean postage. In 1846 he went to England, where he formed the "League of Universal Brotherhood," whose object was "to employ all legitimate means for the abolition of war throughout the world." He was constantly engaged in writing and lecturing, and took a prominent part in all the European peace congresses. He was for several years consul at Birmingham, and returned to the United States after residing altogether nearly 25 years in England. He has published "Sparks from the Anvil" (London, 1848), "Miscellaneous Writings" (1850), "Olive Leaves" (1853), "Thoughts and Things at Home and Abroad" (Boston, 1854), "A Walk from John O'Groat's to Land's End" (1865), and "Lectures and Speeches" (1869).

BURROUGHS, George, an American clergyman, executed for witchcraft at Salem, Mass., Aug. 19, 1692. He graduated at Harvard college in 1670, was a preacher at Falmouth (now Portland), Me., in 1676, and at Salem in 1680. In consequence of some dispute with his people, he returned to Falmouth in 1683; but when that town was destroyed by the Indians in 1690, he went back to Salem. Though a person of unblemished character, he became one of the victims of accusation by the confessing witches. It was testified that two of his wives

had appeared to the witnesses, saying that he was the cause of their death, and threatening if he denied it to appear in court. He was also accused of performing feats of extraordinary strength by diabolical assistance, and of having "tortured, afflicted, pined, consumed, wasted, and tormented" one Mary Wolcott. Although he asserted his innocence in such a way as to draw tears from the spectators, and recited the Lord's prayer, which it was supposed no witch or wizard could repeat without mistake, he was condemned.

BURROUGHS, Stephen, an American adventurer, born at Hanover, N. H., in 1765, died at Three Rivers, Canada, Jan. 28, 1840. At the age of 14 he ran away from home to join the army, but soon deserted. He entered Dartmouth college, which, after committing numerous offences, he left clandestinely before graduating. Having been successively privateersman, ship's physician, and schoolmaster, he acted as pastor of a Congregational church in Pelham, Mass., for about six months, when he was convicted of passing counterfeit money, and imprisoned at Northampton. Having attempted to escape by firing the jail, he was removed to Castle island in Boston harbor, whence he effected his escape with seven other prisoners, but was retaken. Released from prison, he repaired to Canada, where for many years he was at the head of an association of counterfeiters. In the latter part of his life he reformed, entered the communion of the Roman Catholic church, and passed his last years in educating the sons of wealthy Canadians at his own residence, where he had a large and valuable library. Notwithstanding his previous life, he was esteemed and respected by all. His "Memoirs of my Own Life" (2 vols. in 1, Albany, 1811; Philadelphia, 1848) was formerly a very popular book. It relates mainly to his early career.

BURROUGHS, William, an American naval officer, born at Kenderton, near Philadelphia, Oct. 6, 1785, died Sept. 5, 1818. He entered the navy as midshipman in 1800, and rose to the rank of lieutenant. On Sept. 5, 1818, being in command of the sloop Enterprise, he encountered off Portland, Me., the British brig Boxer, Lieut. Blyth, which was captured after a sharp engagement, in which Blyth was killed and Burroughs mortally wounded. The two commanders were buried side by side in Portland, and congress voted a gold medal to the nearest relatives of Burroughs.

BURSCHEID, a town of Prussia, in the province of the Rhine, 18 m. S. E. of Düsseldorf; pop. in 1871, 5,511. It has several silk manufacturing factories.

BURSCHENSCHAFT (from *Bursche*, a youth, a student), an association of German students, originally designed to regulate their social habits and to foster a spirit of nationality. The first organization was formed in 1815 by that portion of the students of Jena who had taken part in the German war of independence. Tü-

bingen, Heidelberg, Halle, and Giessen followed the example in 1815-'17. The war not having been followed by those political reforms which they had anticipated, the students of Jena resolved to convoke a general *Burschenschaft*, the object of which should be to connect the scattered associations into one national brotherhood, by the annual election of a presiding committee. On Oct. 18, 1817, representatives of almost all the German universities met at the Wartburg festival, and in October, 1818, the members of 14 universities again assembled, and adopted a constitution, to which all the universities gave their assent in April, 1819, with the exception of Göttingen, Landshut, and those of Austria. Among the members of the Jena *Burschenschaft* was the student Sand, who had taken a prominent part in the convocation of the students at the Wartburg. When the dramatist Kotzebue was assassinated by Sand, on account of his hostility to the national tendencies of Germany, the German princes became alarmed, and a conference took place at Carlsbad, which on Sept. 20, 1819, decreed the suppression of the associations. The students, however, baffled the designs of the governments. The only change which the interdiction wrought was to make the *Burschenschaften* meet in secret instead of in public, and the secrecy, far from hindering their object, only tended to forward it. In 1827 the original project of a German national *Burschenschaft* was taken up again, but internal dissensions defeated the success of the plan. Two parties formed themselves, the *Germanen*, who were practical politicians and determined reformers, and the *Arminen*, composed of more ideal patriots, who saw less good in violent political changes than in the general development of national power by perfecting their own individual culture. In 1827, at Bamberg, and in September, 1831, at Frankfort, the conflicting parties came together, and the *Arminen*, although in a numerical majority, succumbed to the more energetic *Germanen*. At a general meeting in Tübingen, Dec. 25, 1832, a revolution was openly resolved upon, and the students were all invited to stand by the national German *Burschenschaft*, which had taken up its headquarters at Frankfort-on-the-Main. This declaration was followed by the revolutionary attempt at Frankfort in June, 1833, in which 1,867 students were implicated, and which led to the arrest of students all over Germany. During the revolution of 1848 the students who became most prominent in popular movements were those of Vienna, who had never before joined the *Burschenschaft*.

BURSLEM, a parish and market town of Staffordshire, England, 16 m. N. of Stafford; pop. in 1871, 27,107. It is the principal town in the district called "The Potteries," on the Birmingham and Liverpool railway, and contains a number of large factories, villas, churches, and several public buildings. Here is found a variety of clays which are used in the manufac-

ture of porcelain and earthenwares. Early in the 17th century it was the chief place in England for the production of earthenware, at first of a rude and homely kind, but afterward brought to great perfection by Josiah Wedgwood, who was born at Burslem in 1730.

BURT, an E. county of Nebraska, separated from Iowa on the E. by the Missouri river, and intersected by Middle creek; area, 500 sq. m.; pop. in 1870, 2,847. The Omaha and Northwestern railroad (in progress) is to pass through the S. W. part, and a branch to Tekama in the S. E. part is contemplated. The chief productions in 1870 were 184,062 bushels of wheat, 157,772 of Indian corn, 73,724 of oats, 9,036 tons of hay, and 56,969 lbs. of butter. There were 1,184 horses, 1,143 milch cows, 1,694 other cattle, 1,161 sheep, and 1,924 swine. Capital, Tekama.

BURTON, John Hill, a Scottish author, born in Aberdeen, Aug. 22, 1809. He was educated at Marischal college, Aberdeen, and began the practice of law, which he soon abandoned for literature. To the "Westminster Review," and afterward to the "Edinburgh Review," he contributed articles on law, history, and political economy, and to "Blackwood's Magazine" literary sketches, several of which have been collected under the title of "The Scot Abroad" (1864). He has published the "Life and Correspondence of David Hume" (2 vols. 1846); "Lives of Simon Lord Lovat, and Duncan Forbes of Culloden" (1847); "Political and Social Economy" (1849); "Narratives from the Criminal Trials of Scotland" (1852); "Manual of the Law of Scotland;" "Treatise on the Law of Bankruptcy;" "History of Scotland from the Revolution to the Extinction of the last Jacobite Insurrection" (1853); "History of Scotland from Agricola's Invasion to the Revolution of 1688" (7 vols. 8vo, 1867-'70); and "The Bookhunter" (1869). He aided Sir John Bowring in editing the works of Jeremy Bentham, for which he furnished the introduction, and afterward wrote a volume of "Benthamiana." In 1854 he was appointed secretary to the prison board of Scotland, and upon the transfer of the functions of the board to the home office, he was continued as manager and secretary; and in 1868 he was appointed to report annually to parliament the judicial statistics of Scotland. In this year he also became historiographer royal for Scotland.

BURTON, Richard Francis, a British explorer and author, born at Tuam, Ireland, in 1831. He entered the Indian army in 1849 as lieutenant. While stationed in the presidency of Bombay he spent some time in exploring the Neilgherry hills, and afterward served five years in Sind under Sir C. J. Napier. During these years he wrote "Sinde, or the Unhappy Valley," and "Falconry in the Valley of the Indus" (1850); "Sinde, and the Races that inhabit the Valley of the Indus," and "Goa and the Blue Mountains" (1851). He had also acquired the Arabic, Afghan, Persian, Hindu-

stane, and Mooltanee languages, of the last of which he published a grammar. In 1851 he returned to England, and, receiving a year's furlough, started to visit Mecca and Medina, which no Christian had reached since Burckhardt, in 1814-'15. Arriving at Alexandria, he assumed the character of a wandering dervish; and so perfectly had he acquired the Arabic language and habits, that he was never detected, and succeeded in penetrating to the holy cities. His work, "A Pilgrimage to El Medinah and Mecca" (1855), in which he describes this journey, excited great attention. He soon afterward made an attempt to penetrate into Africa; this journey is described in his "First Footsteps in East Africa, or an Exploration of Harar" (1856). During the Crimean war he served as chief of staff to Gen. Beatson. In 1856 he set out upon another African expedition, starting from Zanzibar, accompanied by Capt. Speke. They penetrated to the lake region, and in 1858 discovered Lake Tanganyika. Burton described this expedition in his "Lake Regions of Central Africa" (1860). He then visited the Mormon settlements in Utah, and published "The City of the Saints" (1861). In 1861 he was made consul at Fernando Po, on the W. coast of Africa, where he wrote "Abbeokuta and the Cameroons," and "A Mission to Gelele, King of Dahomey" (1864). In 1864 he became consul at Santos, Brazil, and wrote "Explorations of the Highlands of Brazil" (1868) and "Letters from the Battlefields of Paraguay" (collected in 1870). In 1868 he went to Damascus as consul; travelled afterward in the Holy Land, and wrote "Unexplored Palestine" (1872); and his "Anthropological Collections in the Holy Land" was published by the anthropological society. In 1872 also appeared "Zanzibar, City, Island, and Coast." This is properly an introduction to his "Lake Regions of Central Africa," having been written before that work; but the manuscript, which had been sent to England, was mislaid in the foreign office. In 1872 he was appointed consul at Trieste. He has also published "Vikram and the Vampire, or Tales of Hindu Devilry" (1869). It is said that he has acquired 85 languages and dialects.

BURTON, Robert, an English clergyman and author, born at Lindley, Leicestershire, Feb. 8, 1576, died in Oxford in 1639 or 1640, about the time which, having cast his own nativity, he had himself predicted. His family were ancient and wealthy. In 1593 he went to the university of Oxford, and was elected student of Christ Church in 1599. Having taken orders, he obtained a college living, and in 1628 was presented by Lord Berkeley to the rectory of Seagrave in Leicestershire. He composed the "Anatomy of Melancholy" in order, it is said, to distract his own mind from mournful reflections. This book, published in 1621, passed through five editions in its author's lifetime, and has repeatedly been reprinted since. Sterne seems to have used it almost as a common-

place book. Dr. Johnson said it was the only book that ever took him out of bed two hours sooner than he wished to rise. Byron called it the most exciting and instructive medley of quotations and classical anecdotes he ever perused. Burton left his books to be divided between the Bodleian and Christ Church libraries, and £100 to each to purchase books.

BURTON, William Evans, an English actor, born in London in 1804, died in New York, Feb. 9, 1860. He was the son of William George Burton, author of "Biblical Researches." Intended for the church, he received a classical education, but at the age of 18 assumed the direction of his father's printing office and edited a monthly magazine. His success as an amateur performer led him to become an actor, and after several years of experience on the Norwich circuit, he appeared with success at the Haymarket in 1832. He wrote several dramatic pieces, one of which, "Ellen Wareham," was played at five theatres in London on the same evening. He came to America in 1834, and at different times was the lessee and manager of theatres in Baltimore, Philadelphia, and New York. In Philadelphia he erected the National theatre, and started in 1837 the "Gentleman's Magazine." In 1841 he became manager of the National theatre in New York, which was consumed by fire in May of that year. He managed Burton's theatre, previously known as Palmo's opera house, in Chambers street, New York, from 1848 to 1856, when he leased the Metropolitan theatre in Broadway. This, under the name of Burton's new theatre, he continued to manage till 1858, when he began a starring tour. Mr. Burton was an accomplished scholar, and had collected a large and valuable library. He gained great success as a manager, while as an actor he excelled in a wide range of comedy characters, being especially identified with those of Captain Cuttle, Toodles, Aminadab Sleek, Mr. Micawber, Poor Pillicoddy, Paul Pry, Tony Lumpkin, &c. He was a frequent contributor to magazines, edited for several years the Philadelphia "Literary Souvenir," and published a "Cyclopædia of Wit and Humor" (2 vols., New York, 1858).

BURTON-UPON-TRENT, a market town of Staffordshire, England, 21 m. E. of Stafford, in a parish of its own name, which lies partly in Staffordshire and partly in Derbyshire; pop. in 1871, 26,358. It is situated in a pleasant vale on the left bank of the Trent, which is navigable to this point by barges, and was formerly crossed here by a remarkable and very ancient freestone bridge of 36 arches, which was partially pulled down and replaced by one of 29 arches in 1868-'74. The streets are well paved and lighted with gas. There are three handsome churches, chapels belonging to various dissenting congregations, a free grammar school for boys, a library and newsroom, almshouses, a union workhouse, a dispensary, and a savings bank. Burton was formerly noted for ala-

baster works, but its chief production now is the famous ale to which it gives its name, and which is consumed in large quantities in Europe, America, and Asia. In 1870 there were 26 breweries in operation, including the immense establishments of Bass and Allsopp, covering respectively about 40 and 50 acres. The other branches of industry are malting, tanning, rope making, iron forging, and the manufacture of cotton and hats. There are fairs five times a year, and a weekly market on Thursday. Burton has communication with all parts of England by the Midland railway and the North Staffordshire and Leicester and Swannington lines; and a branch of the Grand Trunk (or Trent and Mersey) canal joins the Trent about a mile below.—The abbey of Burton, some remains of which are yet visible, was founded about 1002 by an earl of Mercia, and subsequently received charters and privileges from the crown. Some of the abbots sat in parliament. Henry VIII., on the suppression of the monasteries, granted part of the possessions of this abbey, including the town and several hamlets, to an ancestor of the marquis of Anglesey, the present lord of the manor, who thence derives the right of appointing officers for the government of the town.

BURTSCHIED (Fr. *Borcette*), a town of Prussia, in the province of the Rhine, on the river Worm, close by Aix-la-Chapelle, of which it is almost a continuation; pop. in 1871, 10,079. It contains several manufactories, especially of cloths and needles, and some celebrated sulphur springs and baths, whose temperature is from 106° to 155°. It had formerly a famous abbey.

BURY, a parish, parliamentary borough, and manufacturing town of Lancashire, England, between the Roche and the Irwell, 8 m. N. of Manchester, with which city it communicates by railway and canal; pop. of the borough in 1871, 41,517. It is an ancient town, but its importance is of modern date. Since 1846 the streets have been paved and widened, gas and water introduced, sewers constructed, and many handsome buildings erected. The principal edifices are the parish church, with a beautiful tower and spire; a town hall, in the Italian style, built by the earl of Derby; a Gothic church, with a spire 130 ft. high, erected in 1868; an atheneum, a mechanics' institution, a model barrack, and a savings bank. There are many excellent schools. The manufacture of woollens was introduced here in the reign of Edward III., and is still prominent. The cotton manufacture is extensively prosecuted in all its branches; several important improvements in it originated here, and among others that of employing various colors in weaving one piece of cloth. The first Sir Robert Peel established his extensive print works on the Irwell, near this town; and at his residence, Chamber hall, in the immediate vicinity, his son, the celebrated statesman, was born; a bronze statue of him stands in the market place. Bury also contains seve-

ral bleaching and dyeing establishments, paper mills, logwood-grinding mills, and iron foundries. It is governed by the county magistrates, who hold petty sessions twice a week. There are extensive coal mines in the vicinity.

BURY. I. *Ange Henri Blaze de*, a French author, born at Avignon in May, 1813. His name is properly Blaze, that of Bury being assumed from his mother, who was of English descent. He studied at the collège Bourbon in Paris, and made his first literary venture with a poem entitled *Le souper chez le commandeur*, published in 1839 in the *Revue des Deux Mondes*. To that periodical he contributed for many years upon political and social questions. He wrote for it also many poems and critical essays upon Germany and its literature, some of them under the pseudonyme of Hans Werner. Among his works are a translation of Goethe's *Faust*, accompanied with notes and an essay (1840; 9th ed., 1853); *Rosemonde*, an illustrated poem (1841); *Poésies* (1842); *Les Poésies de Goethe* (1843); *Ecrivains et poètes de l'Allemagne* (2 vols., 1846); *La nuit de Walpurga* (1850); *Souvenirs et récits des campagnes d'Autriche* (1854); *Les musiciens contemporains* (1856); *Intermèdes et poèmes* (1859); *Les salons de Vienne et de Berlin* (1861, anonymous); *Le Décaméron*, a comedy (1861); *Le Châtelier et Chassot* (1862); and *Meyerbeer et son temps* (1865). In 1868 he recovered from the family of Meyerbeer his right in *La Jeunesse de Goethe*, of which he wrote the libretto. II. *Marie Pauline Rose Stuart*, a French writer of Scottish descent, wife of the preceding. At the age of 11 she began to contribute essays and tales to the *Revue de Paris* and the *Revue des Deux Mondes* under the pseudonyms of Arthur Dudley and Maurice Flissan. She has written both in English and French. Under one of her pseudonyms she has published *Essai sur Lord Byron*, and the novels "Mildred Vernon" and "Falkenberg," and under her own name *Voyage en Autriche, en Hongrie et en Allemagne* (1851).

BURY ST. EDMUND'S, a parliamentary and municipal borough and market town of England, in the county of Suffolk, on the river Lark, 23 m. N. W. of Ipswich; pop. of the borough in 1871, 14,928. It is well built, and is supplied with gas and water. It has three handsome churches, one of which, St. Mary's, built about 1480, is remarkable for its beautiful carved roof, and contains a monument to Mary, queen of France, afterward duchess of Suffolk, daughter of Henry VII. of England. Among the schools are a free grammar school, founded by Edward VI., a commercial school for 150 boys, national schools, &c. Of nearly 100 almshouses and similar institutions in Bury, the most celebrated is Clopton's hospital for aged widowers and widows. Two fairs are held here during the year; the principal one, which is among the most important in England, commences Oct. 2, and lasts three weeks.—Bury St. Edmund's, or St. Edmund's Bury, as the old writers call it, is supposed to be the Roman Vi-

la Faustina. Its name comes from St. Edmund, king and martyr, who received the manor from Beodric after the dissolution of the heptarchy, and was here crowned king of East Anglia in 856. After his death and canonization the Benedictines founded here an abbey under his protection, which in later ages became the most

magnificent in the kingdom after that of Glastonbury. The abbot, under whom were 80 monks, 16 chaplains, and 111 servants, enjoyed the most extensive privileges, even to the coining of money and infliction of capital punishment. Almost the only relic left of its grandeur is the western gate. On the side of the churchyard



Norman Tower and Abbey.

opposite to this stands the Norman tower, or church gate, a square structure 80 ft. in height, and of unknown age. It originally only formed the principal entrance to the churchyard, but it was used after the dissolution of the abbey as a belfry for a neighboring church. It is considered one of the finest specimens of Norman architecture in existence. Portions of the church remain, but are used as dwellings and shops. Parliaments were held here by Henry III. and several other kings. The town is the birthplace of Sir Nicholas Bacon, Bishop Gardiner, and Bishop Blomfield of London.

BUS, César de, a French priest, born at Cavaillon, Feb. 8, 1544, died in Avignon, April 15, 1607. In youth he led a gay life in the camp and at court, but took orders in 1574, and in 1592 founded at De l'Isle (Vaucluse) the first establishment of the religious order of the *doctrine chrétienne* or *doctrinaires*. At the outbreak of the revolution there were 150 of their establishments in France. The order was restored in 1850 at Cavaillon, with an establishment at Marseilles, and another has since been founded in Paris. De Bus founded in 1589 the *filles de la doctrine chrétienne*, a similar institution for women, which does not appear to have been restored. He became blind near the close of his life. His principal work is *Instructions* (5 vols., Paris, 1666).

BUSBEQUIUS, Angerius Giscianus (AUGIER GHISELEN DE BUSBEQ), a Flemish scholar and states-

man, born at Commynes in 1522, died near Rouen, Oct. 28, 1592. He was employed by Ferdinand I. on several important diplomatic missions, and officiated for many years as ambassador at Constantinople, whence he was recalled in 1562 to take charge of the education of the sons of the emperor Maximilian II. In 1570 he accompanied the archduchess Elizabeth to France on occasion of her marriage with Charles IX., and was ambassador in Paris till 1592, when he left the French court to visit Flanders. On his way he was attacked by a party of leaguers, and although he received no personal injury, the shock was so great that he died before he could reach his destination. During his residence in Turkey he made a collection of celebrated Greek inscriptions and manuscripts, which he afterward presented to the library at Vienna, and also employed an artist to make drawings of rare plants and animals. His principal work is the *Itinera Constantinopolitanum et Asianum, et de Re Militari contra Turcas instituenda Consilium* (Antwerp, 1582), also published under the title *Legationis Turcicae Epistola IV.* (Paris, 1589). His complete works, in Latin, were published at Leyden in 1683, and at Basel in 1740.

BUSCA, a town of Piedmont, Italy, in the province and 9 m. N. W. of Coni, on the left bank of the Maira, an affluent of the Po; pop. about 9,000. Near it excellent wine is produced.

BÜSCH, Johann Georg, a German philanthropist and writer on statistics and commerce, born at Alten-Weding in Hanover, Jan. 3, 1728, died Aug. 5, 1800. He was educated at Hamburg and Göttingen, and in 1756 was made professor of mathematics in the Hamburg gymnasium, which post he held till his death. Besides suggesting many theoretical improvements in the carrying on of trade by the city, he brought about the establishment of an association for the promotion of art and industry, and the foundation of a school of trade, instituted in 1767, which became under his direction one of the most noted establishments of its class in the world. Besides a history of trade (*Geschichte der merkwürdigsten Welthandel*, Hamburg, 1781), he wrote voluminously on all subjects connected with commerce and political economy. His collected works were published in 16 volumes at Zwickau in 1813-'16, and 8 volumes of selected writings, comprising those on trade alone, at Hamburg, 1824-'7. For some time before his death Büsch was almost totally blind.

BÜSCHING, Anton Friedrich, a German geographer, born at Stadthagen, in Schaumburg-Lippe, Sept. 27, 1724, died in Berlin, May 28, 1793. His first geographical work, a description of the duchies of Schleswig and Holstein, was published in 1752. In 1754 he became professor of philosophy at Göttingen, and in 1761 pastor of the German Lutheran church in St. Petersburg. In 1766 he removed to Berlin. His most important work, the *Erdbeschreibung*, of which the first volume was published at Hamburg in 1754, was continued by various authors down to 1807. That division of it in which he describes the countries and nations of Europe (12 parts) was translated into English (6 vols. 4to, London, 1762). He wrote many other works, among which are *Epitome Theologiae* (Lemgo, 1757) and *Grundriss zu einer Geschichte der Philosophie* (2 vols., Eisefeld, 1772-'84).

BUSCHMANN, Johann Karl Eduard, a German philologist, born in Magdeburg, Feb. 14, 1805. He studied in Berlin under Böckh, Wolf, and Hegel, and at Göttingen under Bopp. In 1827-'8 he was a tutor in Mexico, where he gave much attention to the Aztec and other languages. On his return to Germany he was introduced by Bopp to Wilhelm von Humboldt, whom he assisted from 1829 to 1835 in the preparation of his celebrated work on the Kavi language in Java. After Humboldt's death (1835) he was the sole author of the third volume, containing a comparative grammar of the South sea and Malay languages, and was charged by the Berlin academy with editing the whole work (3 vols., Berlin, 1836-'40). Buschmann also published Humboldt's vocabulary of the Tahitian language in his *Aperçu de la langue des îles Marquises et la langue tahitienne* (1843). Alexander von Humboldt employed him to prepare the original manuscript of his *Kosmos* (1845-'59), of which

the last MS. volume, corrected by Humboldt, was in 1866 presented by Buschmann to the emperor Napoleon, who gave it to the imperial library in Paris. Buschmann was made professor in 1840, and director of the royal library at Berlin in 1858. Among his principal works are: *Die aztekischen Ortsnamen* (Berlin, 1853); *Die Spuren der aztekischen Sprache im nördlichen Mexico und höhern amerikanischen Norden* (1859); *Das Apache und athapaskische Sprachstamm* (3 vols., 1860-'63); and *Grammatik der sonorischen Sprachen* (3 parts, Berlin, 1864-'8).

BUSEMBAUM, Hermann, a German theologian, born at Nottelen, Westphalia, in 1600, died in Münster, Jan. 31, 1668. He was rector of the Jesuit college at Münster, and in his *Medulla Theologiae Moralis*, which passed through 50 editions (new ed., 2 vols., Louvain, 1848), he carried the doctrine of the temporal supremacy of the popes to such a height, that the secular tribunals in almost every European state were unanimous in pronouncing condemnation on his work, and committing it to the flames.

BUSH, George, an American theologian, born at Norwich, Vt., June 12, 1796, died in Rochester, N. Y., Sept. 19, 1859. He graduated at Dartmouth college in 1818, studied at Princeton theological seminary, received ordination in the Presbyterian church, was for four years a missionary in Indiana, and in 1831 became professor of Hebrew and oriental literature in the university of the city of New York. In 1832 he published a "Life of Mohammed," and in 1833 a "Treatise on the Millennium," in which he regards the millennial age as the period during which Christianity triumphed over Roman paganism. About the same time he compiled a volume of "Scriptural Illustrations;" in 1835 published a Hebrew grammar; and in 1840 began the issue of a series of commentaries on the Old Testament, which extended to seven volumes. He edited in 1841 the "Hierophant," a monthly magazine, devoted to the explanation of the nature of prophetic symbols. In the same year appeared his "Anastasis," in which he opposed the view of the resurrection which implies a physical reconstruction of the body. This work attracted much attention, and he answered the many attacks which were made upon it in a treatise entitled "The Resurrection of Christ." He connected himself with the "New Jerusalem church" in 1845, translated from the Latin the diary of Swedenborg, and afterwards as editor of the "New Church Repository" and otherwise, labored to develop and maintain the principles of that philosopher. In 1847 he published a work on the higher phenomena of mesmerism, which he deemed a confirmation of the truths of Swedenborg's revelations; and in 1857 "Priesthood and Clergy unknown to Christianity." His memoirs, by W. M. Fernald, were published in 1860.

BUSHEL, an English measure of 8 gallons, divided into 4 pecks, used for dry materials, as

grain, fruit, coal, &c. The gallon, which by act of parliament of George IV., c. 74, § 7, is defined to determine its capacity, must contain 10 lbs. avoirdupois of distilled water, weighed in air at a temperature of 62° F., the barometer being at 30 inches; or in bulk 277·274 cubic inches. The so-called imperial bushel, then, must contain 2,218·192 cubic inches. But if the goods measured are of a kind usually heaped, as potatoes, coal, &c., it was prescribed that the capacity, including the raised cone, should be 2,815 cubic inches. This rule was abolished by act of parliament of William IV. The Winchester bushel was the standard before the imperial from the time of Henry VII. (act of 1497). Its capacity was 2,150·42 cubic inches; its dimensions 18½ inches internal diameter, and depth 8 inches. Heaped, the cone was to be not less than 6 inches high, making with a true cone its contents 2,747·70 cubic inches.—The standard bushel of the United States and of the state of New York is the Winchester bushel of 2,150·42 cubic inches.

BUSHIRE, or *Abu-Shehr*, a seaport town of Persia, in the province of Fars, on the N. E.

coast of the Persian gulf, at the northern extremity of a peninsula, to the north and east of which is the bay. The climate is extremely hot and unhealthy, producing various kinds of disease, especially of the eyes. In 1831 the plague made a fearful havoc among the population, which from 20,000 in previous years dwindled down to 5,000 or 6,000 in 1858; but the number has since somewhat increased. Besides many huts of palm wood outside of the gates, there are about 400 white stone houses in the town, which present an agreeable appearance from a distance; and the *badgirs*, or ventilators, raised over the houses to the height of 100 feet, contribute to enhance this impression. The narrow streets, which are very numerous, are in a miserable condition. There are few handsome buildings in the town excepting the East India company's factory and the sheikh's palace.—Bushire is the great emporium of Persia. Its merchants carry on an extensive trade with India, Russia, and Turkey, and supply almost all Persia with goods. The principal imports from India are steel, indigo, sugars, and spices. Manufac-



Bushire.

tured goods are imported from England and continental Europe, a British consular resident having long been maintained at Bushire. Many goods sent from Europe to India are thence exported to Bushire. The exports are raw silk, sheep's and goats' wool, horses, dried fruit, wine, grain, copper, turquoises, tobacco, yellow dye berries, asafetida and various sorts of drugs, rose water, gall nuts, pearls, and other minor articles. The principal exports of manufactured articles are carpets, shawls, velvets, silk goods, and gold and silver brocades. Cotton is extensively produced, and chiefly retained for home consumption, although some of it is exported to Russia and other countries. The great route to the interior of Persia starts at Bushire, and is of great commercial and

strategical importance. On the land side the town is fortified by a mud wall with round towers. In the war between England and Persia, Bushire became the basis of military operations, and was captured Dec. 9, 1856, at the very outset of the expedition.

BUSHMEN (Dutch, *Bojesmans*), a tribe of S. Africa, inhabiting both banks of the Orange river. The desert region occupied by them S. of the river is within the nominal limits of Cape Colony, and is designated as Great Bushman Land. The Bushmen resemble the Hottentots, but their figure is smaller and more spare, while their life of constant warfare and privation has given them a crafty, savage look, at variance with the simple, stolid expression of the Hottentots. Their language resembles the

Hottentot dialect in its harsh, guttural, and snorting sounds, but the two people do not understand each other. They have no fixed residence, build no dwellings, but live in fami-



Bushmen.

lies and roam about, resting under trees, bushes, and other casual shelter, subsisting upon plunder, eating raw flesh, and when that fails living on snakes, mice, grubs, and vermin. In drinking they lie down. Their usual clothing is a mere sheepskin, although they wear caps or other garments when they can procure them. They are armed with knives, small bows and poisoned arrows, which they use with dexterity. In their own language they are called Saab or Saan. A small number of them in Cape Colony, employed as menials, are comparatively civilized; but missionary efforts are not very successful among them, though active especially on the S. E. boundary, where Hottentots live together with Bushmen.

BUSHNELL, David, an American inventor, born in Saybrook, Conn., about 1754, died at Warrenton, Ga., in 1824. He graduated at Yale college in 1775, and turned his thoughts toward the invention of a machine for blowing up vessels from under water. He successfully exploded many small models, and made a large machine capable of conveying an operator with 150 lbs. of powder, which was tried in vain on the *Eagle*, a British 64-gun ship, lying in the harbor of New York. Bushnell prepared a number of machines in kegs to be floated by the tide upon the British vessels lying in the river at Philadelphia, the result of which attempt gave occasion to the ballad of the "Battle of the Kegs," by Francis Hopkinson. He became a captain in the army, and after the close of the war went to France. It was long supposed that he died there, but he returned to America, became principal of several schools

in Georgia, and finally a physician at Warrenton, where he was known as Dr. Bush.

BUSHNELL, Horace, D. D., an American clergyman, born at New Preston, Conn., in 1802. He graduated at Yale college in 1827, was teacher in an academy at Norwich, Conn., and in 1829 became tutor in Yale college, also studying law and theology. In 1833 he became pastor of the North Congregational church in Hartford. In 1837 he delivered at Yale college the Phi Beta Kappa oration on the "Principles of National Greatness," and in 1847 published "Christian Nurture," in which he discussed the subject of religious education, and treated of the family as a religious institution. In 1849 appeared "God in Christ," three discourses previously delivered, with a preliminary "Dissertation on Language as related to Thought." The views herein expressed respecting the doctrine of the Trinity were questioned, and the author was called upon to answer a charge of heresy before the clerical association of which he was a member. The charge was not sustained. In further explanation and defence of his views, he published in 1851 a work entitled "Christ in Theology," in which he argued that systematic orthodoxy is not attainable, and that human language is incapable of expressing with any exactness theologic science. His other principal works are: "Sermons for the New Life" (1858); "Nature and the Supernatural" (1858); "Work and Play" (1864); "Christ and his Salvation" (1864); "The Vicarious Sacrifice" (1865); "Moral Uses of Dark Things" (1868); and "Women's Suffrage, the Reform against Nature" (1869). He has also published many discourses and addresses, and has been a frequent contributor to religious periodicals.

BUSSEY, Benjamin, a merchant of Boston, born in Canton, Mass., March 1, 1757, died in Roxbury, Jan. 13, 1842. At the age of 18 he enlisted as a private in the revolutionary army, and served for three or four years, when he married and began business as a silversmith in Dedham. At the end of the war he removed to Boston, where he engaged in foreign commerce and acquired a fortune, which he bequeathed to Harvard university, after the decease of certain relatives, to be used for the support of the law and divinity schools, and for the establishment of a school for instruction in practical agriculture. For this last purpose he devised a farm of several hundred acres in West Roxbury, near Boston, where in 1869-'70 the government of the university built a college, and established a school of agriculture and horticulture. The amount of Mr. Bussey's bequest at the time of his death was estimated at \$350,000.

BUSSY D'AMBOISE, Louis de Clermont de, a French cavalier of the second half of the 16th century. He became prominent during the St. Bartholomew massacre, of which he availed himself to murder his relative Antoine de Clermont, with whom he had been in litigation.

The duke of Anjou afterward procured for him the command of the castle of Angers. He attempted to seduce the countess of Montsoreau, who by her husband's command assigned an interview to him, when he was met by the count, and assassinated after a desperate resistance. His death, according to De Thou, was hailed with general delight. One of George Chapman's best dramas is "Bussy d'Ambois," and Alexandre Dumas made Bussy the hero of one of his novels, *La Dame de Montsoreau*.

BUSTAMANTE, Anastasio, a Mexican physician, soldier, and statesman, born at Jiquilpan, in the province of Michoacan, July 27, 1780, died at San Miguel de Allende, Feb. 6, 1858. He was family physician to Don Felix Maria Calleja, military governor at San Luis Potosi, who in 1808 gave him a commission in the San Luis regiment of militia, composed of the sons of the wealthy. He served in all the campaigns in which Calleja commanded till 1819, gaining distinction especially in the battles of Aculco, Guanajuato, and Calderon, and at the siege of Cuautla in 1812, and rising to the rank of colonel. In 1820, having gained the confidence of Iturbide, he was made chief commander of the cavalry, and in 1821 member of the provisional junta. He was shortly afterward raised to the rank of field marshal by the regency, and appointed captain general of the eastern and western provinces of the interior. In April, 1822, he gained a signal victory over the remaining Spanish forces near Juchi. After the death of Iturbide, having taken sides with the federal party, he was by the government of Victoria appointed anew military governor of the provinces of the interior, with the rank of general of division, then the highest in the Mexican army. In 1829 he headed the revolution, and proclaimed the plan of Jalapa toward the end of the same year; and the commencement of the following year found him vice president of the republic and exercising the supreme executive power. In 1832, a new revolution having taken place under Santa Anna, Bustamante resigned the presidency. In 1833 he was exiled and visited the principal countries of Europe, but especially France, where he resided till 1836, when he was recalled by the government after the fall of Santa Anna. He was reelected president of the republic about the middle of 1837, his administration continuing until the end of 1841. He then set out anew for Europe, and remained there till 1845. The next year he was appointed president of the congress, the last important office that he filled. Bustamante was one of the most honorable of the public men of Mexico, and the republic was prosperous under his administration.

BUSTARD (*otis*), a large bird, peculiar to the dry, grassy plains of Europe, Asia, and Africa. It has not been found on the American continent, and only one species in Australia. Bustards were formerly abundant in Great Britain, on the open wolds of Wiltshire, Dorsetshire, and

some parts of Scotland, where it is said that they were coursed with greyhounds, which is by no means impossible, as they cannot take wing easily or without considerable preparation, and when hard pressed on a sudden have the habit of running with their wings outspread like sails to assist them, after the manner of ostriches, with which they have several points in common. There are two European species of this bird, which appears to form a connecting link between the gallinaceous tribes and the ostrich and cassowary. The great bustard (*O. tarda*), so called from his heaviness on the wing, for he is a fleet runner, stands nearly 4 ft. high, and weighs from 25 to 30 lbs. The head and neck in the male are ash-colored, and on each side of the neck he has a tuft of feathers nearly 9 inches long springing from the base of the bill, and somewhat resembling those of the American pinnated grouse. Like them, also, they overlie two naked spots of skin, which in the bustard is of a violet color. The



Great Bustard (*Otis tarda*).

upper parts of the bird are beautifully variegated with black and rust color on a pale reddish ground. The belly and sides are white. The legs are long, naked above the knee, dusky in hue, and have no hind toe, but a callous prominence serving as a heel. The male bird has a water sac in the fore part of the neck, having its entrance under the tongue, capable of containing two quarts of water. The female is much smaller than the male, and less brightly colored; her neck and head are brown, and she has not the curious water sac. The other species, the little bustard (*O. tetraz*), is only 17 inches long. It generally resembles the larger species in form and color, but its head is reddish brown, while the neck of the male is black, with a narrow white border above and below. The upper parts are mottled with the same colors, but with finer and more delicate lines. This species is very common in France, where it is a shy, cunning, and wary bird, fre-

quenting the barren heaths of Brittany and those singular tracts known as the *landes*. The flesh of the bustards, of both species, is excellent, superior, it is said, to that of the turkey;



Little Bustard (*Otis tetrax*).

and it is singular that no attempt seems to have been made to domesticate them. They are mentioned by Xenophon in his *Anabasis* as abundant on the sage plains of Mesopotamia, and are regular autumnal visitants of northern Greece, where they are confounded with the wild turkey.—There are four other species of bustards which are less known. The black-headed bustard (*O. nigriceps*), an Asiatic species, inhabits the highlands of the Himalaya, and also the open Mahratta country, where it lives in large flocks, and is regarded as one of



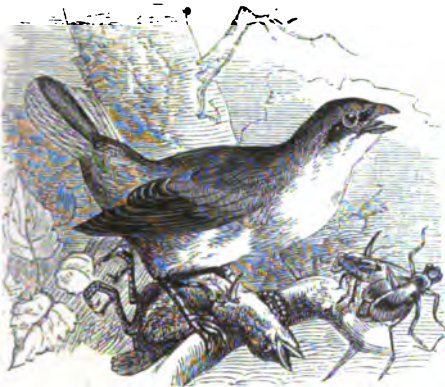
Australian Bustard (*Otis Australasiana*).

the greatest delicacies as an article of food. It is nearly 70 inches long, and its colors above are pale bay undulated with rufous brown. Its head, as its name indicates, is black; its

neck, belly, and under parts white, with the exception of a black patch on the breast. The *O. caeruleus* of Africa was discovered by Le Vaillant in the interior of the Caffre country, S. Africa, and in some parts of Cape Colony. It appears to have no name in the vernacular. Its coloring, like that of the other species, its congeners, is reddish brown above, with the under parts of a pale bluish gray. The kori bustard, discovered by Burchell on the banks of the Orange river, is about 5 ft. in height, and but 7 in extent from wing to wing, while its plumage is said to be so thick as to be proof against anything short of a rifle ball. Little is known of its character or habits. The *O. Denhami*, discovered by Major Denham in central Africa, is another large species, not less than 3 ft. 9 in. in height. It is found in the grassy districts immediately south of the great desert, in the regions of Lake Tchad. It is not numerous, and is always found in company with gazelles, like which it is famous for the brilliancy of its eyes. The Australian bustard (*O. Australasiana*) is larger than the European, higher on the legs, and with longer neck; the male weighs 13 to 16 lbs., and is a majestic-looking bird. It has a large pouch on the front of the neck, which may be inflated so as nearly to touch the ground. This development is peculiar to the breeding season, and is connected with the vocal organs, then abnormally exercised. The colors and habits are as in other bustards.

BUTCHER BIRD, a name applied to the great shrike, belonging to the order *passeres*, tribe *dentirostres*, and family *laniida*. The best known genus of the family is *lanius* (Linn.), characterized by a moderately long and strong bill, with the culmen curved and tip hooked and emarginate; tarsus short and strong; toes long and robust, the outer the longest; hind toe long and broadly padded; claws curved and sharp. There are more than 30 species described in America, Europe, Asia, and Africa, of which the butcher bird (*L. [collyrio] borealis*, Baird), or great American shrike, is a celebrated one. The length of this bird is 10½ inches, the extent of wings 14, of the bill along the back three fourths of an inch. The plumage is soft and blended; long bristles at the base of the bill; wings of ordinary length, 4th quill the longest; tail long, straight, graduated, of 12 rounded feathers; loreal space, behind the eye, wings and tail, brownish black; iris hazel; upper parts light ash-gray, tinged with pale blue; a white streak over eye; lower parts grayish white, tinged with brown on the fore part of breast, and with faint, undulating dusky bars; base of the primaries white, the secondaries and their coverts tipped with the same; in the female the head and hind neck are tinged with brown, and the lower part has more numerous bars. It is common in the middle and northern states for the greater part of the year, retiring northward to breed; according to Audubon, it is not found along the coast of the southern states, *C. Ludovicianus*

(Baird) taking its place. The nest is built of dry grass, leaves, and moss, in the fork of a bush or low tree; the eggs are five or six in number, of a dull cinereous blue color, spotted and streaked at the larger end with yellowish brown; the time of incubation is 15 days. It frequents woody and bushy places, where it sits perched on a branch continually jerking its tail; its flight is undulating and rapid; it is most commonly seen single or in pairs, and is wary and hard to approach. It feeds on insects, especially grasshoppers and crickets; but it also attacks and kills small birds, which it tears apart and swallows in large pieces; it pitches downward like a hawk, with closed wings, on the back of its victim, which it instantly strikes in the head, tearing open its skull. In confinement it eats eagerly pieces of fresh beef. It has the singular propensity of impaling insects and small birds on points of twigs and thorns. It is so bold that it often enters apartments where pet birds are kept, and attempts to seize them from the cages.



Butcher Bird (*Lanius excubitor*).

It imitates the notes of other birds in distress, and when they flock around to see what is the matter, it pounces into the midst. It will pursue birds on the wing, and even small quadrupeds and lizards. Audubon is of opinion that this bird is the same as the *L. excubitor* of Linnaeus, but more recent authorities consider them distinct. The European bird, or great cinereous shrike, is rare in England; it is sometimes trained in Russia for catching small birds, rats, and mice, which, like its American congener, it fixes to a thorn and tears to pieces with its bill; it possesses the same propensity for fixing its food in confinement, according to Selby; it is also called butcher bird. The *C. ludovicianus* (Baird) is a native of the southern states, being confined chiefly to Florida, Georgia, and the Carolinas. This is called the loggerhead shrike, and abounds on the rice plantations, where it does good service in destroying field mice, large grubs, and insects, pouncing upon them like a hawk. In all the

butcher birds the legs and claws are weak, and are never used in tearing their prey; this is effected by their powerful bill, and in this they differ from the other birds of prey, which strike and tear with their talons.

BUTE, an island of Scotland, in the frith of Clyde, separated from the district of Cowall in Argyleshire by a narrow channel called the Kyles of Bute, 16 m. long and 8 to 5 m. wide; area, 60 sq. m.; pop. about 9,500. The surface in the northern parts is rugged and mountainous; the central and southern portions are undulating and tolerably fertile. The temperature is mild and equable, and the island is much resorted to by invalids. Most of the inhabitants speak Gaelic, but English is daily becoming more prevalent. There are three small lakes, Fad, Ascog, and Quein. The town of Rothesay, once the residence of the Scottish monarchs, is pleasantly situated on the E. coast, and Mountstuart, the seat of the marquis of Bute, the chief proprietor, is near it.

BUTE. **L. John Stuart**, third earl of, a British statesman, born in Scotland in 1713, died in London, March 10, 1792. In his 10th year he succeeded to his father's title and estates. He was educated at Eton. In 1736 he married the only daughter of Lady Mary Wortley Montagu, and in February, 1737, was elected one of the 16 representative peers of Scotland. In 1738 he was appointed lord of the bedchamber to Frederick, prince of Wales, eldest son of George II. On the death of his royal patron, in March, 1751, the widowed princess of Wales gave him her confidence and friendship, and he also obtained a great influence over the youthful prince of Wales, who, when elevated to the throne in 1760 as George III., made him a member of the privy council, and in March, 1761, one of the secretaries of state. His wife was created a British peeress in her own right, as Baroness Mountstuart. In the following October, William Pitt, finding his powers as nominal head of the administration weakened by the vast influence of the new secretary, retired from the cabinet; and in May, 1762, when the duke of Newcastle also resigned, Lord Bute succeeded him as prime minister. With considerable ambition and inconsiderable abilities, Lord Bute was now in an office for which he was ill adapted, and soon became unpopular. He was vigorously attacked by John Wilkes in the "North Briton," and by Churchill the poet, who assailed him because he was a Scotchman. England was then involved in the seven years' war. Lord Bute made peace, but was accused, in conjunction with the princess dowager, of having been bribed to grant too favorable terms to the enemy; and even Lord Camden, many years later, stated his conviction of the truth of the charge, as Bute's patrimonial estate was worth only £1,500 a year, and he was only life tenant of Wortley, though he invested £300,000 in land and houses. Junius also intimates corruption, but without supporting his charges by evidence. At last, on April 7, 1763, within five

days after he had been bitterly attacked by name in the "North Briton," Bute suddenly resigned. Retaining his influence over the king, he nominated his immediate successors; but a cessation of all intercourse with his majesty soon followed, though for a long time after his influence was supposed to continue. Lord Bute went back into private life, passing his time between Scotland and England, with an occasional visit to the continent. The closing years of his life were spent in a villa on the coast in Hampshire. He had some literary tastes, gave a sinecure to Home, the author of "Douglas," granted a pension of £300 per annum to Dr. Johnson, and published at his own expense (£10,000) 9 quarto volumes delineating English botany, and after 12 copies were printed destroyed the plates.—Bute's eldest son was created marquis of Bute in the British peerage in 1796. One of his grandsons was created Baron Wharnccliffe in 1826. Another (born 1799, died Nov. 6, 1845) was created Baron Stuart de Rothesay in 1828, and was ambassador to France. **II. John Patrick Crichton Stuart**, third marquis of, fourth in descent from the preceding, born Sept. 12, 1847. He succeeded his father March 18, 1848. He is noted for his great wealth and for his many titles, including, besides the marquise, three earldoms (Windsor, Bute, and Dumfries), two viscountships, six baronies and lordships, and a Nova Scotia baronetcy. In 1869 he joined the Roman Catholic church, and on April 16, 1872, married a lady of the same faith, a daughter of Lord Edward George Fitzalan Howard, the second son of the late duke of Norfolk. He purchased some land near Jerusalem for the endowment of an asylum for pilgrims, and is the reputed hero of Disraeli's "Lothair."

BUTESHIRE, a county of Scotland, consisting of the islands of Bute, Arran, Inchmarnoch, and the Cumbrays, and the small islands of Lamlach and Pladda, in the frith of Clyde; area, 171 sq. m.; pop. in 1871, 16,977. It returns one member to parliament. The inhabitants of these islands are principally engaged in agriculture and fishing; there are some quarries and coal mines. Rothesay, the county town, in the island of Bute, is a watering place.

BUTLER, the name of eight counties in the United States. **I.** A W. county of Pennsylvania; area, 800 sq. m.; pop. in 1870, 86,510. The surface is somewhat uneven, and the soil sandy, but yielding fair crops and affording good pasturage. Silk is produced to some extent. Bituminous coal, iron, and limestone are abundant. The Alleghany river touches the N. E. and S. E. corners, and it is drained by affluents of Beaver river. The chief productions in 1870 were 294,464 bushels of wheat, 179,577 of rye, 453,894 of Indian corn, 1,099,168 of oats, 113,994 of buckwheat, 187,984 of potatoes, 52,567 tons of hay, 1,447,098 lbs. of butter, and 224,220 of wool. There were 11,521 horses, 16,078 milch cows, 14,650 other cattle, 67,831 sheep, and 23,775 swine. Capi-

tal, Butler (pop. 1,985), on Conequeessing creek, 30 m. N. of Pittsburgh. **II.** A S. county of Alabama, drained by Sepulga and Pigea rivers; area, about 875 sq. m.; pop. in 1870, 14,981, of whom 6,891 were colored. The surface is hilly, and in great part covered with pine woods. It is traversed by the Mobile and Montgomery railroad. The chief productions in 1870 were 251,512 bushels of Indian corn, 60,116 of sweet potatoes, and 5,854 bales of cotton. There were 1,017 horses, 1,042 mules and asses, 2,344 milch cows, 3,682 other cattle, 2,281 sheep, and 11,245 swine. Capital, Greenville. **III.** A S. W. county of Kentucky, intersected by Green river, which is here navigable by steamboats; area, 500 sq. m.; pop. in 1870, 9,404, of whom 643 were colored. The surface is uneven, and the soil moderately fertile. The chief productions in 1870 were 13,875 bushels of wheat, 340,115 of Indian corn, 60,506 of oats, 20,588 lbs. of wool, and 1,008,582 of tobacco. There were 2,733 horses, 2,206 milch cows, 3,483 other cattle, 10,663 sheep, and 17,147 swine. Capital, Morgantown. **IV.** A S. W. county of Ohio, bordering on Indiana, and intersected by the Miami river; area, 455 sq. m.; pop. in 1870, 39,912. Limestone well adapted for building purposes underlies the county, and water power is abundant. The Miami canal, and the Cincinnati, Hamilton, and Dayton, the Cincinnati, Richmond, and Chicago, and the Cincinnati and Indianapolis Junction railroads traverse it. The county contains a number of interesting monuments of the aboriginal inhabitants, chiefly on the banks of the Great and Little Miami rivers, described by Squier and Davis in "Monuments of the Mississippi Valley." At Oxford are the Miami university, a state institution, the Oxford female college, and the Western female seminary. The chief productions in 1870 were 627,377 bushels of wheat, 1,716,862 of Indian corn, 229,621 of oats, 277,016 of barley, 113,135 of potatoes, 10,692 tons of hay, 126,977 lbs. of tobacco, 25,856 of wool, and 548,878 of butter. There were 8,181 horses, 6,472 milch cows, 7,824 other cattle, 6,637 sheep, and 27,078 swine. Capital, Hamilton. **V.** A N. E. county of Iowa, drained by several branches of Red Cedar river; area, 576 sq. m.; pop. in 1870, 9,951. The Dubuque and Sioux City railroad traverses the S. portion. The greater part is prairie. The chief productions in 1870 were 598,557 bushels of wheat, 422,448 of Indian corn, 261,000 of oats, 46,739 of potatoes, 16,351 tons of hay, 15,752 lbs. of wool, 268,273 of butter, and 26,519 of cheese. There were 3,922 horses, 3,439 milch cows, 4,460 other cattle, 3,952 sheep, and 6,522 swine. Capital, Butler Centre. **VI.** A S. E. county of Missouri, bordering on Arkansas, bounded E. by St. Francis river, and intersected by the Big Black Water; area, 560 sq. m.; pop. in 1870, 4,298, of whom 21 were colored. The surface is level or moderately hilly. The chief productions in 1870 were 10,994 bushels of wheat.

185,009 of Indian corn, 12,018 of oats, and 48,245 lbs. of tobacco. There were 1,809 horses, 1,355 milch cows, 2,340 other cattle, 2,680 sheep, and 12,605 swine. Capital, Poplar Bluff. **VII.** An E. county of Nebraska, bounded N. by the Platte river, and intersected by the North fork of the Big Blue; area, 576 sq. m.; pop. in 1870, 1,290. The principal productions in 1870 were 18,668 bushels of wheat, 21,020 of Indian corn, 9,350 of oats, 6,050 of potatoes, and 2,261 tons of hay. There were 574 horses, 460 milch cows, 861 other cattle, 478 sheep, and 606 swine. Capital, Savannah. **VIII.** A S. county of Kansas, E. of the Arkansas river; area, 1,519 sq. m.; pop. in 1870, 3,035. It is well watered by the White and Walnut rivers and other affluents of the Arkansas. A railroad from Cottonwood Falls in Chase county, on the Atchison, Topeka, and Santa Fé railroad, is projected, which will run S. W. through the county. The chief productions in 1870 were 5,844 bushels of wheat, 88,915 of Indian corn, 2,406 of oats, 1,640 of potatoes, and 4,465 tons of hay. There were 987 horses, 1,082 milch cows, 4,454 other cattle, 2,603 sheep, and 684 swine. Capital, Eldorado.

BUTLER, Alban, an English theologian and author, born at Appletree, Northamptonshire, in 1710, died at Saint Omer, France, May 15, 1773. He was educated at the Roman Catholic seminary in Douai, France, where he became professor of philosophy and theology. He was sent on a mission to England, and was for some time chaplain to the duke of Norfolk, during which he began his "Lives of the Saints," which was completed during a subsequent residence in Paris. He afterward became president of the college of Saint Omer. He wrote several works, the most important being the "Lives of the Fathers, Martyrs, and other principal Saints" (5 vols. 4to, Paris, 1745), which has been several times republished (8 vols. 12mo, Dublin, 1779; Edinburgh, 1800, edited by his nephew, Charles Butler; 12 vols. 12mo, Derby, 1843; 4 vols. 8vo, New York, 1846).

BUTLER, Andrew Pickens, an American senator, born in Edgefield district, S. C., Nov. 17, 1796, died near Edgefield Court House, S. C., May 25, 1857. He graduated at South Carolina college in 1817, and was admitted to the bar in 1819. In 1824 he was elected to the state legislature, and in 1831, during the nullification excitement, was chosen colonel of a regiment of cavalry. In 1833 he was appointed a judge of the courts of general sessions and common pleas, and afterward of the supreme court of the state. In 1846 he was elected to the senate of the United States, and was soon after made chairman of the judiciary committee. In the senate he took a prominent part in all discussions in which the interests of the South were involved. His report upon the fugitive slave law was sustained by him in an elaborate speech. His last speech in the senate, in

defence of South Carolina, and in reply to Mr. Sumner, led indirectly to the assault upon Mr. Sumner by Preston S. Brooks.

BUTLER, Benjamin Franklin, an American lawyer and politician, born at Kinderhook, N. Y., Dec. 15, 1795, died in Paris, France, Nov. 8, 1858. He studied law with Martin Van Buren, and on being admitted to the bar in 1817 became his partner. He was appointed district attorney of Albany county in 1821, and held the office four or five years. In 1825 he was appointed one of the commissioners to revise the statutes of New York, and in 1828 was a member of the state assembly. He was attorney general of the United States under President Jackson in 1831-'4, and acting secretary of war from October, 1836, to March, 1837; and from 1838 to 1841 he was United States district attorney for the southern district of New York. He afterward returned to the practice of the law in New York, and was principal professor of law in the university of the city of New York, of which he had been one of the founders. During the greater part of his life he was an influential member of the democratic party, but on the passage of the Kansas-Nebraska bill, abolishing the Missouri compromise, he joined the republicans, and voted for Fremont in 1856.

BUTLER, Benjamin Franklin, an American lawyer and politician, born at Deerfield, N. H., Nov. 5, 1818. He graduated at Waterville college, Maine, in 1838, and commenced the practice of the law at Lowell, Mass., in 1841. He early took a prominent part in politics on the democratic side, and was elected member of the Massachusetts house of representatives in 1853, and of the state senate in 1859. In 1860 he was a delegate to the democratic national convention which met at Charleston. Here he endeavored to persuade the convention to simply reaffirm the principles enunciated in 1856 at Cincinnati, by the convention which nominated Mr. Buchanan for the presidency, but was defeated by a vote of 105 to 198. When a portion of the delegates reassembled at Baltimore, Mr. Butler, after taking part in the opening debates and votes, announced that a majority of the delegates from Massachusetts would not further participate in the deliberations of the convention, on the ground that there had been a withdrawal in part of the majority of the states; and further, he added, "upon the ground that I would not sit in a convention where the African slave trade, which is piracy by the laws of my country, is approvingly advocated." In the same year he was the democratic candidate for governor of Massachusetts. At the time of President Lincoln's call for troops in April, 1861, he held the commission of brigadier general of militia. On the 17th of that month he marched to Annapolis with the 8th Massachusetts regiment, and was placed in command of the district of Annapolis, in which the city of Baltimore was included. In

May he was transferred to the command of Fortress Monroe and the department of Eastern Virginia. While here, some slaves who had come within his lines were demanded by their masters. He refused to deliver them up on the ground that they were contraband of war; hence arose the designation of "contrabands" often applied to slaves during the war. In August he captured Forts Hatteras and Clark on the coast of North Carolina. He then returned to Massachusetts to recruit an expedition for the gulf of Mexico and the Mississippi. On March 23, 1862, the expedition reached Ship island, and on April 17 went up the Mississippi. The fleet under Farragut having passed the forts, April 24, and virtually captured New Orleans, Gen. Butler took possession of the city on May 1, and governed it with great vigor until November, when he was recalled. Near the close of 1863 he was placed in command of the department of Virginia and North Carolina, and his force was afterward designated as the army of the James. While Gen. Grant was moving toward Richmond, Gen. Butler made an unsuccessful attempt to take Petersburg. In December, 1864, he conducted an ineffectual expedition against Fort Fisher, near Wilmington, N. C., and then returned to his residence in Massachusetts. In 1866 he was elected by the republicans a member of congress, and soon took a prominent part in its proceedings. He was the most active of the managers appointed in 1868 by the house of representatives to conduct the impeachment of President Johnson. In 1871 he was an unsuccessful candidate for the republican nomination to the office of governor of Massachusetts. In 1868 and 1870 he was reelected to congress, of which he is still a member (1873).—See "General Butler in New Orleans," by James Parton (8vo, New York, 1863).

BUTLER, Charles, an English historian and lawyer, nephew of Alban Butler, born in London, Aug. 15, 1750, died there, June 2, 1832. He was called to the bar in 1791, being the first Roman Catholic admitted after the passing of the relief bill of that year, and gained a high reputation as a constitutional lawyer. His first work which attracted any attention was *Horæ Biblicæ*, a history of the original text, early versions, and printed editions of the Old and New Testaments, and also of the Koran, the Zend-Avesta, and the Edda (2 vols. 8vo, 1797–1807), which passed through five editions and a French translation. This was followed by *Horæ Juridicæ Subsecivæ*, a connected series of notes respecting the geography, chronology, and literary history of the principal codes and original documents of the Grecian, Roman, feudal, and canon law. He continued and completed Hargrave's "Coke upon Littleton," supervised the 6th edition of Fearn's "Essay on Contingent Remainders," and contributed to Seward's "Anecdotes" an interesting "Essay on the Character of Lord Mansfield's Fo-

rensis Eloquence." He wrote a history of the geographical and political revolutions in the empire of Germany, and a "Historical and Literary Account of the Formularies, Confessions of Faith, or Symbolic Books of the Roman Catholic, Greek, and Principal Protestant Churches." During his last 25 years Mr. Butler devoted his pen especially to the vindication of the Catholic church. He continued his uncle's "Lives of the Saints," and produced "Historical Memoirs of the English, Irish, and Scottish Catholics." When Southey's "Book of the Church" appeared, it was replied to in Butler's "Book of the Roman Catholic Church," which gave rise to a voluminous controversy. He also wrote biographies of Fénelon, Bossuet, Erasmus, Grotius, &c. In 1822 was published the first volume of his "Reminiscences," an autobiography; the second appeared in 1827.

BUTLER, James, duke of Ormond. See ORMOND.

BUTLER, James, an American soldier of the revolution, born in Prince William co., Va., died in South Carolina in 1781. He emigrated to South Carolina about 1772, took part in Gen. Richardson's "Snow Camp expedition," and afterward in a similar expedition under Gen. Williamson in 1776. When Lincoln had taken the command of the continental forces of the South, Butler joined him near Augusta in 1779. In 1780 Lord Cornwallis issued a proclamation requiring the people to swear allegiance to the crown. Butler refused to comply, was arrested, lodged in the jail at Ninety-Six, and subsequently conveyed to the provost of Charleston and then to the prison ship, where he was kept for 18 months in close confinement. When released, he was summoned to engage in an expedition against a foray of the Tories of his precinct, and was killed at Cloud's creek.

BUTLER, John, a tory leader during the American revolution, born in Connecticut, left his native state before the outbreak of the war, and settled in the valley of Wyoming. Here, at the very beginning of the struggle, he organized a band of marauders and murderers, who were painted and dressed like Indians, but were in reality for the most part Americans in disguise. At the head of these he plundered and burned the villages of that region, and massacred their inhabitants. For these services the British government on the conclusion of the war granted Butler 5,000 acres of land in Canada, and a pension of £500 a year.

BUTLER, Joseph, an English theologian, born at Wantage, Berkshire, May 18, 1692, died in Bath, June 16, 1752. He was educated in the Presbyterian communion, and in 1713 addressed a series of letters to Dr. Clarke stating two objections to the reasoning in his "Demonstration of the Being and Attributes of God." About this time Butler adopted Episcopal views, entered the university of Oxford in 1714, and was soon after admitted into holy orders. On the united recommendation of his

college friend Edward Talbot and of Dr. Clarke he was appointed preacher at the Rolls in 1718, and about 1725 was promoted to the wealthy but secluded rectory of Stanhope. Before leaving the Rolls he published a collection of 15 sermons, in which he combats those moralists who make self-interest the only motive of action, and affirms the authority of the moral faculty over both the passions and affections of the soul, and the acts of life; yet he does not pronounce upon the nature of conscience, and it is difficult to say whether he regarded it as a power of sentiment or of reason. After seven years of retirement at Stanhope, he was appointed chaplain to Lord Chancellor Talbot, and in 1736 became clerk of the closet to Queen Caroline. In that year he published his "Analogy of Religion, Natural and Revealed, to the Constitution and Course of Nature." This work is one of the most profound and original theological studies in the language, and is designed to prove that the principal objections which are raised against Christianity may also be raised against the structure of the universe and the course of nature, and thus to show that they are the work of a single author. It was the fruit of many years' reflection, and is composed in a most compressed and ungraceful style. Sir James Mackintosh says that no other thinker so great was ever so poor a writer. In 1738 Dr. Butler was made bishop of Bristol, whence he was promoted in 1750 to the see of Durham. His death occurred while on a visit to Bath in hope of recovering his health, which had rapidly declined, and he was buried in the cathedral of Bristol, where two monuments are erected to his memory.

BUTLER, Samuel, an English poet, born at Strensam, Feb. 13, 1612, died in London, Sept. 25, 1680. The son of a farmer, he commenced his education at Worcester, and sought ineffectually the means of studying at Cambridge. As clerk to a justice of the peace he obtained leisure during several years to cultivate literature and the arts. He was afterward an inmate of the family of the countess of Kent, where he enjoyed the use of a library and the conversation of the learned Selden, who often employed him as an amanuensis. He next appears, probably as tutor, in the family of Sir Samuel Luke, one of Cromwell's officers, who is supposed to have been the original of Sir Hudibras. After the restoration he was appointed secretary to the earl of Carbury, lord president of Wales, who made him steward of Ludlow castle. At 50 years of age he married a widow of good family and fortune, but the fortune was lost by bad investment. In 1663 appeared the first part of "Hudibras," a poem ridiculing the Puritans, abounding in wit, learning, satire, and ingenious thought, and which has remained without a rival in English burlesque poetry. The knight Sir Hudibras and his squire Ralph are made to present a most grotesque appearance, in ludicrous exaggeration of the affected lan-

guage, dress, and moral severity of the Cromwellians. The poem suited the prevalent taste of the time, and obtained the highest popularity. It was quoted by Charles II., studied by the courtiers, and applauded by the whole royalist party. The only recompense received by Butler was a present of £300 from the king. Two other parts of it were published in 1664 and in 1678, but it was left unfinished. Although Butler enjoyed a great reputation at a brilliant court and among distinguished men, there is even less known of the later than of the earlier part of his life, and it is only certain that he died in poverty and obscurity in a mean street in London. Among his shorter poems is one on "The Elephant in the Moon," in which he ridicules the philosophical researches of the royal society. Of his few prose works, the "Characters" are the most interesting.

BUTLER, Samuel, an English bishop and philologist, born at Kenilworth, Warwickshire, Jan. 3, 1774, died at Eccleshall castle, Staffordshire, Dec. 4, 1839. He was educated at Rugby and at St. John's college, Cambridge, in 1797 was elected fellow of his college, and in 1798 was appointed head master of the endowed school of Shrewsbury, in which he continued 38 years. While thus occupied he received several church preferments: in 1802, the vicarage of Kenilworth; in 1817, a prebendal stall in Lichfield cathedral; in 1822, the archdeaconry of Derby. He was made D. D. in 1811, and was appointed bishop of Lichfield in 1836. His best known literary production is his edition of *Æschylus*, from the text of Stanley (4 vols. 4to, 1809-'16). He also published a "Praxis on the Latin Prepositions," several geographical works, and a number of tracts and sermons. In conjunction with the Rev. Francis Hodgson he translated Lucien Bonaparte's epic of "Charlemagne."

BUTLER, Walter, an Irish soldier of fortune, one of the assassins of Wallenstein, died near Schorndorf, Germany, in September, 1634. He early enlisted as a private in the imperial army, and became an officer of the Irish legion of which one of his relatives (in the Polish and afterward in the Spanish service) was colonel. In 1631 he was captured in defending Frankfurt-on-the-Oder against Gustavus Adolphus, at whose intercession he was speedily ransomed on account of his youth and bravery. In 1632 Wallenstein appointed him colonel of a regiment of dragoons, chiefly Irish, and rewarded him munificently for his valor in the Bohemian campaign, and especially at the capture of Eger. Misunderstandings arose between them, but Wallenstein continued to confide in the fidelity of Butler, whom he permitted to escort him with other officers to the castle of Eger. Here Butler, in connivance with Piccolomini, became an accomplice with Gordon, Leslie, and Devereux in the assassination of Wallenstein, Feb. 25, 1634. The emperor rewarded Butler by conferring upon him the titles of count, chamberlain, and gen-

eral, and by presenting him with extensive domains. He died shortly after his participation in the battle of Nördlingen, Sept. 6, 1634, and was buried in Bohemia. He bequeathed large sums to Roman Catholic missions, and made donations to his sister and to Deveroux, who succeeded him in the command of his regiment. He figures as one of the characters in Schiller's *Wallenstein*. See Carve, *Itinerarium, cum Historia Facti Butleri, Gordon, Lesly et Aliorum* (3 vols., Mentz and Spire, 1640-'46).

BUTLER, William, an American soldier, born in Prince William county, Va., about 1757, died at Columbia, S. C., in 1821. He graduated at South Carolina college as a physician, became lieutenant in the army of Lincoln in 1779, was engaged in the battle of Stono, and served in the corps of Pulaski. At the first rising of the partisan leaders in the Carolinas, Butler joined the troops under Pickens, served with Lee under Greene, after whose defeat at Ninety-Six he took the field as a partisan, rose to a command in the mounted rangers, and took part in many sharp encounters with the Tories, being usually employed in movements which demanded boldness and celerity. In 1787 he was a member of the convention to consider the adoption of the federal constitution, against which he voted, was subsequently a member of the convention which formed the constitution of South Carolina, and held several civil offices. In 1796 he was elected major general of militia. In 1800 he was chosen a member of congress, and in 1806 was appointed chairman of the committee of investigation in the case of Gen. Wilkinson, who was charged with complicity in the Burr conspiracy. He resigned his seat in congress in 1813 to make way for John C. Calhoun; and in 1814 he was called by the governor to take command of the forces of South Carolina, supposed to be in danger of invasion by the British. At the close of the war he retired to his plantation. He was father of A. P. Butler, United States senator, and of William Butler, who was a member of congress for a single term.

BUTLER, William, D. D., an American clergyman and missionary, born in Dublin, Ireland, in 1819. He completed his theological training at Didsbury, near Manchester, England, in 1842, and joined the Irish Wesleyan conference in 1844. After preaching six years in the Irish conference, and six more in the New York East and New England conferences in America, he was sent in 1856 to India to select a field and found a mission for the Methodist Episcopal church, and established the Methodist missions in the valley of the Ganges. During nearly ten years he labored there, until the mission was erected into an annual conference in 1864. He then returned to the United States, preached for some time in New England, and became one of the secretaries of the American and foreign Christian union. He is the author of a "Missionary Compendium" (1850), and "The Land of the Veda" (8vo, 1872).

BUTLER, William Allen, an American lawyer and poet, born in Albany, N. Y., in 1825. He graduated at the university of the city of New York in 1843, studied law with his father, B. F. Butler, and after travelling in Europe from 1846 to 1848 entered upon the practice of his profession in New York. In 1846 he published "The Future," an academic poem; in 1850, "Barnum's Parnassus," a volume of the character of the "Rejected Addresses;" in 1857, "Nothing to Wear," and in 1858, "Two Millions," both satirical poems; in 1862, "Martin Van Buren," a biographical sketch, and in 1871, "Lawyer and Client" and his collected poems.

BUTLER, William Orlando, an American soldier and politician, born in Jessamine county, Ky., in 1798. He studied law, and at the beginning of the war of 1812 enlisted as a private, was in the battles of Frenchtown and the river Raisin, was wounded, rose to be captain, served at Pensacola and New Orleans, was breveted major in December, 1814, and became aide-de-camp to Gen. Jackson. In 1817 he resigned, and entered upon the practice of the law in Kentucky. He was elected to congress in 1843, and was an unsuccessful candidate for governor in 1844. At the beginning of the Mexican war he reentered the army, was made major general June 29, 1846, and led the charge at Monterey, where he was wounded. For his gallantry here a sword was voted to him by congress. On Feb. 18, 1848, he succeeded Gen. Scott in command of the army in Mexico, which he held till May 29. In 1848 he was the democratic candidate for vice president. In 1856 he was appointed governor of Nebraska by President Pierce, but declined. He was a member of the peace congress of 1861. He wrote "The Boatman's Horn," and other short poems.

BUTT, Isaac, an Irish lawyer, politician, and author, born at Glenfin, county Donegal, Ireland, in 1813. He was educated at Trinity college, Dublin, where he obtained a scholarship in 1832, graduated in 1835, was appointed Whately professor of political economy in 1838, and called to the Irish bar in 1840. He was elected a member of the corporation of Dublin, and in 1843 opposed O'Connell's agitation for a repeal of the union. In the Irish state trials of 1848 he acted as counsel for Smith O'Brien and others, and in 1865 for several of the Fenian prisoners. In 1850 he was an unsuccessful candidate for parliament for Mayo, but was elected for Harwich, and in 1852 for Youghal, which he represented till 1865, and in 1871 was returned for Limerick, in the interest of the "national and home rule" movement, of which he was the originator. He is a magistrate for the county of Cork. He was one of the projectors of the "Dublin University Magazine," of which he was for some time editor, and to which he contributed "Chapters of College Romance," republished in a separate form. In 1860 he published a "History of the Kingdom of Italy," and in 1870 a "Practical

Treatise on the New Law of Compensation to Tenants in Ireland."

BUTTE, a N. county of California, bounded N. by the Sacramento river, S. E. by the Feather river and its middle fork, and watered by Butte creek and the forks of the Feather river; area, 1,458 sq. m.; pop. in 1870, 11,403, of whom 2,082 were Chinese. The highlands are generally covered with pine and cedar forests; the valleys are wooded and fertile. It is rich in gold, platinum, silver, quicksilver, iron, and lead. The Marysville branch of the California Pacific railroad crosses the W. portion. There are 13 quartz mills for the production of gold, 4 grist mills, and 18 saw mills. The chief productions in 1870 were 746,162 bushels of wheat, 16,490 of Indian corn, 339,698 of barley, 27,919 gallons of wine, 11,799 tons of hay, and 351,023 lbs. of wool. There were 4,315 horses, 2,330 milch cows, 7,954 other cattle, 76,864 sheep, and 19,242 swine. Capital, Oroville.

BUTTER (Gr. *βούτυρον*, from *βούς*, ox or cow, and *τύπος*, coagulum; Lat. *butyrum*), the fatty, non-azotized portion of milk. It exists in the form of microscopic globules, varying somewhat in size, and more in quantity, in different animals. The milk of the cow is regarded as the standard. The globules are distributed almost uniformly throughout the mass of fresh milk, and are the cause of its white opacity. They measure from $\frac{1}{1000}$ to $\frac{1}{500}$ of an inch in diameter, the variation being greater in healthy than in diseased milk. They have a caseous covering, which while the milk is fresh prevents their aggregation during ordinary agitation. Being the lightest of the constituents, they slowly rise to the surface when the milk is allowed to stand, and this separation is retarded or accelerated by the temperature and other circumstances. The amount of butter in a given quantity of milk varies considerably, and depends much upon the season and the food of the cow. Völcker, from careful analyses of unadulterated milk obtained from cows at different seasons of the year, and grazing in different pastures, found it to vary from 1.79 to 7.62 per cent. Milk of fair quality averages about 4.5 per cent. Cream usually contains about 45 per cent. of butter, milk yielding about 10 per cent. of cream. According to Chevreul, cows' butter is composed of stearine, margaric, and oleine, with small quantities of butyrine, caproine, and caprine, to which its odor is due. According to Heintz, it consists of oleine, a large quantity of palmitine and a small quantity of stearine, together with small quantities of glycerides, yielding by saponification myristic acid and butic acid, $C_4H_9O_2$. It dissolves in 28 parts of boiling alcohol of sp. gr. .82. It easily becomes rancid from the separation of the fatty acids from the glycerine, which may be considerably prevented by salting, or by melting and separating foreign substances which induce decomposition. It is of a pale yellow color, solidifying at 79.7° F. When the temperature

rises to 89.6° it may be completely saponified, yielding, according to Chevreul, glycerine, with stearic, margaric, oleic, and small quantities of butyric, caproic, and capric acids; or, according to Heintz, stearic, oleic, palmitic, and small quantities of myristic and butic acids. Manufactured butter has the following average composition:

Pure fatty matter.....	88.00
Water	12.50
Common salt.....	8.50
Milk sugar.....	.60
Caseine and albumen.....	.40
	100.00

—To obtain the fatty contents of the milk cells as free as possible from all the other constituents of the milk, is the first and most important step in butter making. This, after carefully collecting the cream, is accomplished by churning, which process is performed in vessels of various forms, all having one object, viz., the agitation of the milk. (See CHURN.) The cream which rises during the first 12 hours is rather thinner than that which rises afterward, but is richer in butter. This is because the globules which have the thinnest cell walls are of less specific gravity than the others, and rise sooner. Moreover, during the process of milking, and in straining, many of the cells are broken, thus liberating the pure butter, which is still lighter. The best butter can therefore be made from cream obtained during the first 12 hours of the setting of the milk; but as this involves more expense, and to a certain extent injures the subsequent product, the mode is rarely practised. Usually, the best market butter is made from all the cream obtained during one setting. Churning the whole milk is sometimes practised, with the idea that a greater percentage of butter may be obtained. Butter makers, however, say that, although more material may be obtained in this way from the milk, the amount of pure butter is less, and consequently the product is inferior in quality, and much sooner becomes rancid. In butter making, particular care should be given to cleanliness and temperature; the most scrupulous attention to the former being necessary to prevent the butter, which possesses the greater sensitiveness to bad odors and impure matter, from becoming tainted. The cows' udders should be washed and wiped dry before the milking begins, and the vessels into which the milk is drawn should have been carefully scalded and cleaned. The pans or cans into which the milk is strained, and the strainer itself, should be in the most thorough state of cleanliness, and the apartment in which the milk is placed for the rising of the cream should be perfectly free from dirt or impure odors. The quality of butter is also sensibly affected by the food. Good butter possesses differences of flavor according as the cows are fed on clover or blue grass, carrots or turnips. A small quantity of wild onion is readily detected in the butter as well as in the milk; and the im-

pure constituents of stagnant pools impart characteristic differences in flavor and odor, resembling the impurities. It is therefore of great importance, as affecting the quality as well as the quantity, that the cows should have free access to pure spring water. With few exceptions, the best butter is now made in large establishments, called creameries or butter factories, as in this way a more perfect system can be followed, and greater exactness in time and temperature, uniformity in churning, and many important details, can be secured. The most convenient arrangement includes a spring house, the floor of which is covered with running water to the depth of about 18 inches, in which the milk is set in cans or buckets 8 or 10 inches in diameter and about 20 inches in height. The temperature of the water should be about 56° F. Instead of having the water run over the floor, it may be made to pass through vats or troughs. When the cans containing the recently drawn milk are placed in the water, which should rise a little above the level of the milk, the animal heat is soon reduced to between 56° and 58° F., and the milk will keep sweet for 36 hours even in the hottest weather. This temperature allows the cream to rise with greater facility, and with less admixture of other constituents, than can be obtained in any other way. Some butter makers allow the milk to stand for 36 hours; others say that 24 hours is practically sufficient for all the cream to rise. It is found that as much cream is obtained by using deep as by using shallow vessels, while deep vessels have the advantage in economy of space, a better control of the temperature, less exposure to the air, and consequently less drying and hardening of the cream, by which the quality of the butter is affected. After the cream has risen it is to be removed by skimming, and after standing a suitable time is placed in the churn. The kind of churn generally preferred by the best butter makers is the common dash churn, made of white oak. This form possesses advantages too important to be overlooked over those which have been invented with a view to shorten the process of churning. It gathers the butter in masses, excluding the caseous cell walls and other constituents in a more perfect manner, and consequently yields a better product, as these substances cannot be entirely removed by after-working. Much depends upon the manner in which the operation is performed, even with the same churn. A very desirable quality in butter is what is called grain. This is destroyed by too rapid churning, by melting, or by heating the cream too highly before churning. Good butter possesses this quality of grain in consequence of the contents of the cells preserving in a certain degree their form, or at least their identity; a result which can only be obtained by keeping the material throughout the whole process of manufacture at a temperature at which the particles of butter are solid and firm, and by using

the proper amount and kind of mechanical force. When cold, firm butter of prime quality is broken, the grain may be easily recognized. The swing churn, and the substitute for it lately invented in England, by which the cream is thrown alternately from one end of the vessel to the other, probably allow of a more perfect preservation of the grain than even the dash churn. The chief objections to their use are increased labor and the limited amount of cream that can be churned at one time. The temperature at which the churning should be performed is a matter of great importance, as well as the time occupied. At the commencement the cream should be at about 55° F. During the process it rises to 64° or 65°. The time occupied in churning 12 or 15 gallons of cream should be from 40 to 60 minutes. Greater rapidity is injurious, as it mixes the cell walls and the buttermilk with the butter, renders it less firm and solid, and injures the grain. When taken from the churn it should be thoroughly washed in pure cold water, using a ladle, and not the hands. It should then be salted with about $\frac{1}{4}$ of its weight of the purest and finest salt, which should be thoroughly incorporated with it by means of a butter worker or ladle, the hands being never allowed to touch the butter. From 8 to 12 hours afterward a second working should be performed and the butter packed in strong and perfectly tight white oak firkins. When filled, they should be headed up and a strong brine poured in at the top until all the interstices are filled. It should then be placed in a cool, well ventilated cellar. Many persons suppose that it is necessary for cream to become sour before it is fit to churn; but, according to Prof. Johnson of Yale college, "readiness for churning depends chiefly upon the time that has elapsed since milking, and the temperature to which it has been exposed in the pans. The colder it is, the longer it must be kept. At a medium temperature, 60° to 70°, it becomes suitable for the churn in 24 hours, or before the cream has entirely risen. Access of air appears to hasten the process. The souring of milk or cream has directly little to do with preparing them for the churn. Its influence is, however, otherwise felt, as it causes the caseine to pass beyond that gelatinous condition in which the latter is inclined to foam strongly at low temperatures, and, by enveloping the fat globules, hinders their uniting together. On churning cream that is very sour, the caseine separates in a fine, granular state, which does not interfere with the gathering of the butter." In Devonshire a method called "clouting" has been practised. The new milk, after standing 12 hours, is gradually raised to a temperature of 180° F., and then returned to the milk room until all the cream has risen. This process has been thought by those who practised it to allow of a more complete separation of the cream, and to shorten the duration of churning; but according to the principles above laid down

which are obtained from the best practice, the process is inferior to that of the modern creameries. Dr. Ure gives the following directions for curing butter, known as the Irish method: "Take one part of sugar, one of nitre, and two of the best Spanish great salt, and rub them together into a fine powder. This composition is to be mixed thoroughly with the butter as soon as it is completely freed from the milk, in the proportion of one ounce to 16; and the butter thus prepared is to be pressed tight into the vessel prepared for it, so as to leave no vacuities. This butter does not taste well till it has stood at least a fortnight; it then has a rich, marrowy flavor that no other butter ever acquires." At Constantinople fresh butter is melted over a slow fire, and the scum removed as it rises. It is then salted, and may be kept in good condition two years. Thénard says that the heat should not exceed 140° F.—The ancients were almost entirely unacquainted with butter. It is mentioned in the English version of the Old Testament, but modern Biblical scholars regard the Hebrew word *'hemah*, rendered butter, as denoting cream or a liquid preparation. The oldest mention of butter is by Herodotus, in his account of the Scythians. Hippocrates mentions both butter and cheese. Plutarch tells of a visit paid by a Spartan lady to Berenice, the wife of Deiotarus, tetrarch of Galatia. This lady smelled so strongly of sweet ointment and Berenice of butter that they could not endure each other's presence. Ælian says that the Indians anointed the wounds of their elephants with butter. Dioscorides mentions the making of butter from sheep's milk, by agitation, and the pouring it in a melted state over pulse and vegetables, instead of oil, and recommends its use in pastry. At that time a soot was made by burning butter in a lamp, from which they prepared an ointment for inflammation of the eyes. Galen says that cows' milk yields the best butter, goats' milk giving an inferior article, and asses' milk the poorest. He says that butter may be very properly employed for ointments, and that when leather is besmeared with it the same purpose is answered as when it is rubbed over with oil. Butter was scarcely used or known by the Greeks or Romans during the 2d century. The Greeks obtained their knowledge of it from the Scythians, Thracians, and Phrygians, while the Romans became acquainted with it through the Germans. The Roman writers say that the Germans used a great deal of milk, some affirming that they made it into cheese, while others say that they made butter. Pliny says that they used butter as food, but did not make cheese. The Romans, however, did not use it as food, but as an ointment and in medicine; and their writers on agriculture do not mention it as an article of food, as they do cheese and oil. The olive oil which the Romans produced in great quantities seems to have satisfied their tastes, and even at the present day butter is rarely used in southern Europe.—The state

of New York produces more than one fifth of all the butter that is made in the United States; the total product of all the states in 1870 being 514,092,683 lbs., of which the product of New York was 107,147,528 lbs. Pennsylvania produced 60,834,644, Ohio 50,266,872, Illinois 36,083,405, Iowa 27,512,179, Michigan 24,400,185, Indiana 22,915,385, Wisconsin 22,473,036, Vermont 17,844,896, Tennessee 9,571,069, Massachusetts 6,559,161, and Maryland 5,014,729 lbs. The great butter counties in New York are St. Lawrence, Delaware, Chautauque, Jefferson, and Orange. Orange county still retains its reputation for excellent butter, but furnishes a much smaller quantity than several others. St. Lawrence in 1870 produced 8,419,095, Delaware 6,185,715, Chautauque 5,319,814, Chautauque 5,049,037, Jefferson 4,888,508, and Orange 1,403,409 lbs. The most important butter county of Pennsylvania in 1870 was Bradford, which produced 3,704,709 lbs. The exports of butter from the United States to various countries for the year ending June 30, 1871, were 3,965,048 lbs., valued at \$853,096. Of this amount 2,201,934 lbs. went to Great Britain and her possessions.

BUTTERFIELD, WILLIAM, an English architect, born Sept. 7, 1814. He is known as one of the leaders in the Gothic revival in England, and for his application of color to external decoration. Among his works may be mentioned St. Augustine's college, at Canterbury; All Saints' church, Margaret street, London; St. Alban's church, Gray's Inn road, London; and the new chapel of Balliol college, Oxford.

BUTTERFLY, the popular name of several families of insects of the order *lepidoptera*, undergoing a complete metamorphosis, having four wings, and a tongue changed into a suctorial organ; from the last character they come under the sub-class of *haustellata* of Fabricius. The term butterfly includes all the diurnal lepidoptera, or those which fly by day, of which the *papilionidæ* are the principal family; the other families, as given by Mr. Stephens, are *nymphalidæ*, *lycanadæ*, and *hesperiadæ*. The crepuscular and nocturnal lepidoptera will be noticed under the titles *HAWK MOTHS* and *MOTHS*. The order was named by Linnæus from the Greek words *λεπίς* (scale), and *πτερά* (wings), indicating the characters peculiar to the wings, which are covered on both sides with imbricated scales or feathers, to the unassisted eye presenting the appearance of dust or powder, but under the microscope displaying an arrangement as uniform and characteristic of species as that of the scales of fishes and the feathers of birds. The beauty of this order has made them the special study of naturalists and the delight of collectors, so that their habits, metamorphoses, and structure are very well known. The most interesting and instructive points are connected with their metamorphoses, and these will be more fully alluded to under the title *CATERPILLARS*.—In the lepidoptera, the parts about the mouth are

changed into suctorial organs; the mandibles are very much reduced, and the maxillæ are transformed, each into a semi-canal, extensible, and capable of being rolled up spirally, which, when united, form the suctorial organ (*lingua spiralis*); at the base of this organ are two very short maxillary palpi, between which and the hairy labial palpi it is sheathed when rolled up; this tongue, if it may be so called, is very long in the butterflies. In the caterpillar state these organs are masticatory and not suctorial, adapted for the food of these voracious larvæ, while in the perfect insect the long tongue is necessary to obtain the liquid honey contained in the deep calyxes of flowers. In some species the anterior and lateral surfaces of the maxillæ are provided with a considerable number of minute papillæ, which are probably organs of taste as well as of exquisite touch. The eyes are compound. The abdomen has six or seven segments, is attached to the thorax by a very small portion of its diameter, and has no sting nor ovipositor; the legs are six in number, each composed of five parts, the tarsus having five articulations; in some genera the anterior pair are short and folded against the chest, and entirely useless as locomotive organs. The ventral nervous system consists of seven ganglia, the first two, the largest, belonging to the thorax; the connecting cords are single, except between the thoracic ganglia. In the caterpillars the ventral cord consists of 11 nearly equal ganglia; during the pupa state the first and second and the third and fourth are fused together, forming the second thoracic ganglia, which send off the nerves to the legs and wings; the fifth and sixth are also fused into one. Respiration is effected by means of tracheæ extending through all parts of the system, and opening externally by stigmata on the sides of the body; the trunks arising from the stigmata open into two large lateral canals, from which the tracheæ branch off. They have a well marked urinary apparatus; the Malpighian or uriniferous tubes are usually six in number, long, free, and open into the stomach by two excretory ducts; the tubes contain cells, disposed in rows, filled with very fine granules of a dark or brownish color; on the rupture of the cells, their contents pass into the stomach and digestive canal, and are either evacuated with the fæces, or separately as a troubled liquid; it is well known that they emit a considerable quantity of urine, when bursting from their pupa envelope. The two sexes are distinct, and the rudiments of the sexual organs exist in the youngest larvæ, though their development takes place principally during the pupa state. The females lay their eggs, which are numerous and vary in form according to the species, upon such vegetable substances as the larvæ are to feed upon; the time at which the eggs arrive at maturity coincides with the end of the pupa state, so that the sexes are ready to unite soon after they leave this state; this act accomplished,

both sexes soon periah; the spermatie particles are filiform and very active. The wings are membranous and veined, and covered with an immense number of beautiful scales, varying in size, shape, and coloration, implanted by a small pedicle resembling the stem of a feather. An idea of the immense number and exceeding minuteness of these wing scales may be formed from the fact that Leeuwenhoek counted 400,000 on the small silkworm moth; in a piece of modern mosaic work there may be nearly 900 separate pieces in an inch square, while the same extent of surface on a butterfly's wing may contain from 100,000 to 900,000.—The life of the butterfly is a continued series of changes from the time of its leaving the egg till it becomes a perfect insect. As soon as the caterpillar is hatched it begins to eat eagerly, and increases rapidly in size during this larva state, changing its skin several times; before each change it ceases to eat, remains motionless, and sometimes attaches itself by a slight web to the under surface of a leaf; it gets rid of the old skin by various contractions of the whole body, which separate the dry and shrivelled covering on the back, the insect escaping in the course of a few minutes; sometimes the internal lining of the alimentary canal, from the mouth to the extremity of the body, comes away with the skin; the latter takes place most frequently when the larva is about to change into a pupa, and often proves fatal. When the full-grown caterpillar is ready to assume the pupa, nymph, or chrysalis state (for these are synonymous), it ceases to eat, evacuates the intestines, and suspends its contracted body to the under surface of some object, either by its legs, head downward, or by a little rope of silk; after remaining suspended several hours, it changes its skin for the last time in the manner above alluded to; the legs, antennæ, and wings are extended along the body, and the whole is strengthened by the drying of the transparent fluid which facilitated the separation of the skin. In the pupa state the insect does not eat, and remains perfectly quiet; the pupa of the lepidoptera is said to be "obtected," because the future limbs are seen on the outside of the case. The duration of the butterfly in the pupa state depends much on external circumstances; if this condition happen in the hot period of summer, the perfect insect may appear in eight or nine days, or it may be prolonged to two or three weeks, and may even exist during the whole winter; during this state the insect is in a condition like that of the hibernating animals, respiration and circulation being reduced to their minimum in the first part of its confinement, but becoming active toward the close. At the proper time the pupa case is burst open, and the perfect butterfly suspends itself with its new wings hanging downward; after these have become developed fully by active respiration and circulation, the insect remains at rest a short time until the external covering be-

mes hardened, forming the dermo-skeleton; is then the perfect butterfly, which sips the honey from the flowers, reproduces, and dies.—The butterflies, properly so called, fly only during the day, and at rest usually hold their wings erect; the antennæ are terminated by a little club, or are filiform in a few genera; they are the only lepidoptera, a few moths excepted, in which the lower wings do not have a rigid bristle or fringe to retain the upper pair; their caterpillars have always 16 feet, and the chrysalis is naked, attached by the tail, and in general angular. Linnæus comprised all the butterflies under the genus *papilio*, but Latreille divided them into two sections, as follows: Section 1 contains all those which have a single pair of spines, on the posterior extremity of the tibiæ, the wings perpendicular when at rest, and the antennæ usually club-shaped at the end, but sometimes filiform; this includes the genera *papilio* and *hesperia rurales* of Fabricius, and is itself divided as follows: 1. Those in which the third articulation of the lower palpi is sometimes almost wanting, at others distinct, but as well covered with scales as the preceding one, and the hooks of the tarsi very apparent; some of them are six-footed, all the feet formed for walking, and nearly the same in both sexes, and their chrysalis in addition to the common posterior attachment is fixed by a silken thread across the body, or enclosed occasionally in a large cocoon, and the central partition cell of the under wings is closed underneath; in the four-footed species the chrysalis is simply attached by the tail; the caterpillars are elongated and almost cylindrical. 2. Those in which the lower palpi have three distinct joints, of which the last is nearly naked or with much fewer scales than the preceding one, the hooks of the tarsi very small and scarcely projecting, and the discoidal cell of the under wings open behind; the caterpillars are oval, or formed like the sow-bug; the chrysalis short, contracted, smooth, and attached by a silken thread across the body. Section 2 is composed of species whose posterior tibiæ have two pairs of spines, one at the end and the other above, whose lower wings are commonly horizontal when at rest, and whose antennæ often end in a bent point; the caterpillars, few of which are known, fold up leaves, and spin within this covering a thin silken cocoon, in which the chrysalis is developed, smooth and without angular projections.—Among the genera of the first division of section 1 is *papilio* (Latr.), remarkable for their elegant shapes and beautiful colors; those spotted with red on the breast Linnæus called *equites Troes*, or Trojans, and those without the spots *Achivi*, or Greeks. They are found in the tropical and temperate zones of both hemispheres; the caterpillars, when touched, thrust forth from a slit in the first segment just behind the head a pair of soft horns joined together somewhat like the letter Y; these are scent organs, giving out an unpleasant odor, and doubt-

less designed for their protection against flies and ichneumons. Many have the under wings elongated, as the *P. Machaon* (Linn.), a European species of large size, with yellow wings spotted and striped with black, the under ones having some blue spots near the posterior edge, one of which is like an eye with red at the internal angle; the caterpillar is green, with black rings dotted with red, and feeds on the leaves of the carrot, fennel, &c. Of the American species, one of the finest is the *P. asterias* (Cramer), whose



Papilio asterias.

wings expand about four inches; it is of a black color, with a double row of yellow dots on the back, a broad band of yellow spots across the wings, and a row of yellow spots near the hind margin; the lower wings are tailed, and have seven blue spots between the yellow band and the outer row of yellow spots, and near the posterior angle an orange eye-like spot with a black centre; the spots on the under side are tawny orange. This species is very numerous in July, hovering over flowers, especially the sweet-scented phlox; in this and the following months the eggs are laid singly on various umbellate plants; the caterpillars have been found on the parsley, carrot, parsnip, celery, and other garden vegetables, to which they are very destructive; they come to their growth toward the end of September, when they become chrysalids, in which state they remain all winter, being transformed into butterflies in May or June following. Another of our common and beautiful species is the *P. philenor* (Fabr.), with tailed greenish-black wings; the superior wings with four or five white spots on the margin, most conspicuous beneath; the lower wings highly polished green, with six pearl-white spots before the margin, beneath with a broad green border upon which are seven large fulvous spots, each surrounded by a black ring, and marked by a lateral white spot, and about six small white dots on the inner edge; thorax black, breast dotted with yellow, abdomen green with a lateral double row of whitish dots; the female is the largest, with brown wings and coppery re-

flections. The *P. Turnus* (Linn.), a common American species, somewhat resembles the *P. Machaon* of Europe; the general color of the wings is yellow, bordered with black dotted with yellow, with five partial bands of black anteriorly; on the lower wings are six yellow lunules in the black margin; the anal angle fulvous edged with white, with two or three green spots near it; the body above is black, with a yellow lateral line; breast yellow, with two oblique lateral black lines. In the mountainous regions of Europe and Asia is found the genus *Parnassius* (Latr.), the females of which have a horny boat-shaped pouch at the end of the abdomen; the caterpillars make a cocoon of leaves united by silken threads. A well known species in the Swiss valleys is the *P. Apollo* (Linn.),



Parnassius Apollo.

white spotted with black, with white eye-like spots, edged with red on the lower wings; the caterpillar is velvety black, with a row of red spots on each side and one on the back. The genus *Thais* (Fabr.) is characteristic of the south of Europe. In the preceding genera the internal margin of the lower wings is more or less concave; in the genus *pontia* these are dilated beneath the abdomen so as to form a groove. The butterflies of this genus are found in various regions of the globe, and are commonly seen flitting over the fields and moist places, mounting high in the air when they meet a companion; the caterpillar has no protruding tentaculum on the neck, and the chrysalis is suspended by a thread passed across the body. The genus *pontia* includes the British cabbage butterflies, consisting of nine or ten species, of a white or yellow color and small size; the general color of the caterpillars is green, and they are very injurious to the vegetable garden. In Massachusetts there is a white butterfly, *P. oleracea* (Harris), which hovers over the cabbage, radish, and turnip beds about the last of May or beginning of June, for the purpose of depositing its eggs; these are fastened, to the number of three or four on each leaf, to the under surface; they are hatched in a week or ten days, and the caterpillars attain their full size in three weeks, about 1½ inch in length, and of a pale green color; they devour every part of the leaf; the chrysalis state lasts about 11 days, so that the per-

fect insects come out the latter part of July, and are ready to lay the eggs for another brood, the chrysalids of which survive the winter and come out in the following May. These butterflies fly low and lazily when about to deposit their eggs, and are easily caught in large numbers by a muslin net; the titmouse and other insect-eating birds devour the caterpillars with avidity. Among the four-footed butterflies, one of the largest and handsomest genera is *Danais* (Latr.), including the Fabrician genera of *euplas* and *idea*, in which the antennæ are terminated by a club, the inferior wings rounded and not forming a groove for the abdomen, and the upper wings more or less triangular. *D. pteripus* (Linn.), a common and large North American species, is of a fulvous yellow color, with dilated black veins, black margin dotted with white, especially in the superior angle of the upper wings; body black, with numerous white dots on the trunk; the larva is ringed with black and white, with two slender processes on the anterior and two on the posterior part of the body; the chrysalis is of a delicate green color, with golden dots; it feeds on different species of *asclepias*, and is abundant in the middle and southern states. In the genus *argynnis* (Latr.), the anterior feet are short and feeble, the under surface of the lower wings is often decorated with silvery and opaline spots, or yellow ones upon a fulvous ground, and the upper surface varied with red or orange, with spots or lines of black or brown; the caterpillars are beset with spines. In England, where there are several species, these butterflies are called fritillaries. The *A. Diana* (Cramer) of the southern states, though not one of the handsomest of the genus, is yet pretty from the contrast of the blackish and pale orange of its upper surface, and from the slender silvery lines of the under surface of the lower wings; its general color above is a dark brown, with a very broad fulvous exterior margin, with a few blackish spots and nervures. The genus *melitæa* was separated from the last by Fabricius, and is distinguished principally by the yellow spots and checkered appearance of the under surface of the lower wings, and by the larva, which is pubescent, with small fleshy tubercles on the body, which is not armed with spines. The *M. myrina* (Cramer) is a pretty little species found from Massachusetts to Florida, somewhat resembling the *M. selene* of Europe; the wings are fulvous, with black spots and undulating lines; below there are more than 30 silvery spots, and an eye-like spot near the base of the inferior ones. In the genus *Tanacore* (Fabr.), the knobs of the antennæ are short and broad; the palpi are long, curving, and contiguous, and form a kind of beak; the wings are jagged or tailed on the posterior edges; the under side of the lower wings is often marked with a golden or silvery character in the middle; the caterpillars are armed with numerous spines, often live in company, and do not conceal themselves under a web or within a folded

leaf; the head of the chrysalis has two horn-like elevations and a prominence on the back resembling a nose, presenting rather a grotesque appearance; in both sexes the anterior pair of feet are short and very hairy, and the two posterior pairs with double nails. Here belong the tortoise-shell butterfly (*V. urticae*, Linn.), and the following three other British species: the "Camberwell beauty" (*V. antiopa*, Linn.), with angular wings of a deep purplish black, with a yellowish or whitish band on the posterior edge, and a row of blue spots above; the peacock butterfly (*V. Io*, Linn.), reddish fulvous



Peacock Butterfly (*Vanessa Io*).

above, with a large eye-like spot on each wing, on the upper reddish surrounded by a yellowish circle, the under blackish surrounded by a gray circle, with some bluish spots, and under the wings blackish; and the "painted lady" (*V. cardui*, Godt., more properly placed by Mr. Stephens in the genus *cynthia*), with wings red above, varied with black and white, underneath marbled with gray, yellow, and brown, with five eye-like bluish spots on their edges. The following American species are worthy of mention: The antiopa butterfly (*V. antiopa*, Linn.), occurring, as has been seen, also in Europe; this butterfly passes the winter in some sheltered place in a partially torpid state; great numbers are sometimes seen crowded together in barns, apparently lifeless, with the wings doubled together over the back, but quickly becoming active on exposure to heat; it comes out very early in spring, often before the snow is off the ground, and may be seen sporting with torn and faded wings, early in March in sheltered spots. The caterpillars despoil the poplar, willow, and elm of their foliage, on which they are found in great numbers early in June; they are black, with minute white dots, and a row of eight brick-red spots on the top of the back; being nearly two inches long, and armed with spines, they were formerly sup-

posed to be capable of inflicting dangerous wounds; the first brood is produced in June, and a second in August, which become per-



Antiopa Butterfly (*Vanessa antiopa*).

fect insects before winter. The semicolon butterfly (*V. interrogationis*, Fabr.) has the wings on the upper side tawny orange, with brown and black spots; lower wings generally black above, beneath reddish, or marbled with light and dark brown, and a pale golden semicolon on the middle, whence the name; the wings expand from $2\frac{1}{2}$ to $2\frac{3}{4}$ inches, while those of the preceding are from 3 to $3\frac{1}{2}$ inches; it appears in May, and again in August, and is seen till the middle of October in sunny places. The caterpillars live on the American elm and linden trees, and on the hop vine, to which they are very destructive; the spiny caterpillars are favorite receptacles for the eggs of the *pteronomalus Vanessa*, a tiny chalcidid parasitic insect of the order *hymenoptera*, which destroys great numbers of the ohrysalids in whose bodies the little maggots come to maturity. Smaller species are the *V. comma* (Harris) and *V. progne* (Fabr.), which are much alike, expanding from 2 to $2\frac{1}{2}$ inches, above of a tawny orange, the fore wings bordered and spotted with black, the hind wings blackish posteriorly, with two black spots in the middle, and a row of bright orange spots before the hind margin, the under side marbled with light and dark streaks, with a silvery comma in the former species, and a silvery L in the latter, on the middle of the hind wings. The caterpillars are very much alike, being pale yellow, with a reddish head, white spines tipped with black, and a row of four rusty spots on each side of the body; they are found on the American elm in August. The genus *nymphalis* (Latr.), or *apatura* (Fabr.), contains some very large and beautiful species; the anterior feet are useless for locomotion, and the abdomen is received in a groove formed by the dilatation of the lower wings; the caterpillars are less spiny than in

the preceding genera. The purple emperor of Europe, *A. iris* (Linn.), has very strong and thick wings, and is capable of a high and long-sustained flight; instead of the zigzag motions of common butterflies, the species of this genus soar in a steady manner like a bird of prey; from their flying over the tops of forest trees, they are difficult to capture, and therefore highly prized by collectors; M. Godart has described more than 260 different species, some of which are found in this country. In the genus *morpho* (Fabr.), peculiar to South America, the antennæ are almost filiform; in this are included some of the most gorgeous of the lepidoptera. In the genus *hipparchia* (Fabr.), or *satyrus* (Latr.), the antennæ end in slight knobby or elongated swellings; the anterior feet are short, the hind pairs with double nails, the internal margin of the wings excavated to receive the abdomen, and the middle discoidal cell closed posteriorly; the caterpillar has no spines, but is downy, with the posterior extremity forked. It contains many species, the wings of which are often ornamented with beautiful eye-like spots; they frequent dry localities, over which they fly in a jerking and sudden manner. The *H. Andromacha* (Hübner), frequenting the southern and southwestern states, has the wings brown, with submarginal blackish spots, beneath paler, with a series of eye-like spots. The *H. semidea* (Say), about two inches in extent of wings, is of a brown color, the lower wings marbled below with black and white; it inhabits the highest summits of the White mountains of New Hampshire, and, according to Say, seems to be confined to that region.—In the second division of the first section are several small six-footed butterflies belonging to the family of *lycanada*; the caterpillars are short and almost oval, with feet so short that they seem to glide rather than walk, and they secure themselves by the hind feet and a silken loop across their bodies. Here belongs the genus *argus* (Lam.), which contains many small species of an azure-blue color, variegated with black and white. The genus *erycina* (Lat.) belongs to America; *polyommatus* (Fabr.) is named from the beautiful eye-like spots of the under surface of the wings, which are generally blue above in the males, and brown in the females. The genus *lycæna* (Fabr.) includes the splendid little species called "coppers" by collectors. According to A. and O. Speyer, the *lycanada* and *erycinada* belong to the division of *heteropoda*, in which the anterior legs are of a different form in the two sexes; in the latter, the males possess cleaning paws; in the former, the males want claws on the anterior tarsi, and the claw joint ends in a sharp point.—The second section of diurnal lepidoptera includes the family of *hesperiada*, which frequent grassy places, flying short distances in a jerking manner, whence they are called "skippers" by English writers. The *hesperia malva* (Fabr.) feeds on the mallows, whose leaves it folds up, and in

which it is changed; the wings are indented, blackish brown above, with white dots and spots, beneath greenish gray with similar irregular spots; the caterpillar is gray, with a black head and four yellow points on the first ring, which is narrowed; the chrysalis is black, slightly powdered with blue. In the genus *eudamus* of Dr. Boisduval is the *E. tityrus* (Fabr.) of this country; it expands from 2 to 2½ inches, and is of a general brown color; the first pair of wings with a transverse band and a few spots near the tip of a honey-yellow color; the hind pair with a short rounded tail, and a broad silvery band across the middle beneath. This large and handsome species appears about the middle of June, hovering over sweet-scented flowers; it flies so rapidly and strongly that it is difficult to take it without injury; the females lay their eggs singly on the leaves of the locust (*robinia pseudo-*



Skipper Butterfly (*Eudamus tityrus*).

caia and *R. viscosa*); hatched in July, they roll themselves in a covering of the leaves, as a protection from the weather and birds; the full-grown caterpillar is about two inches long, of a pale green color, with transverse streaks of darker green, with a red neck and head; each lives in its own case, one end of which is left open for egress at night, at which time it feeds; they remain as chrysalids in their leafy cocoons during the winter; the viscid locust is sometimes completely stripped of its leaves by this caterpillar. Of the genus *urania* (Fabr.), Mr. Swainson says the butterflies composing it "are perhaps the most splendid insects in creation. No art can effectually represent the changeable and resplendent green which relieves the velvet black of the wings, and which varies with every change of light. The typical species are found in tropical America, where they fly with amazing rapidity, and perform, like their prototypes the swallows, annual migrations."—The butterflies are to insects what the humming birds are to the

feathered tribes, the analogy holding good not only in their brilliant colors and manner of flight, but also in the nature of their nutriment, the honeyed juices of flowers. The happy life of the butterfly, flitting from flower to flower, from one sensual delight to another, resembles that of professed pleasure-seekers, the "butterflies of fashion," whose only object is enjoyment, whose existence is a blank, and whose lives add nothing to the progress of humanity; they are mere useless consumers of the products of other men's labors; a whole generation dies, and is deservedly forgotten. From the transformations of the butterfly, natural theology has drawn one of the most simple, beautiful, and convincing arguments for an existence beyond the grave. We see the airy, brilliant, perfect insect, derived from the crawling, disgusting, and voracious caterpillar—a worm transformed into a sylph—a change that no one, unless it had been actually seen, would believe possible. Reasoning from analogy, this emblem of the butterfly has seemed typical of the change of the corruptible into the incorruptible after death; the grovelling human desires are represented by the creeping caterpillar; in the chrysalis we have presented to us the darkness and stillness of the tomb; and in the butterfly we recognize a newborn existence of the spirit, freed from the imperfections of the earthly and finite, and rejoicing in the pleasures of immortality.

BUTTERNUT, or **White Walnut** (*Juglans cinerea*, Linn.), a beautiful broad-headed American tree, growing 20 to 30 ft. high, with numerous spreading branches and a smooth ash-colored bark. Its leaves, 12 to 18 inches long, consist of 6 to 18 pinnæ terminated by an odd one, on a long footstalk. The sterile flowers issue from

in May, and the fruit ripens in September and October. The form of the fruit is oblong ovoid; it is crowned at the summit by the stigma and ends of the calyx, and invested with glandular hairs secreting a resinous and odorous substance; the outer husk is thin and tough, of a dark brown color when ripe, covering a hard, thick-furrowed, and sharply ridged and sculptured nut, about 2 inches in length, rounded at the base and acute at the apex; the kernel is sweet and pleasant, but from its abundance of oil (whence the name) soon turns rancid unless carefully dried. A mild and useful laxative is extracted from the inner bark of the root of the butternut tree, and the bark and shells afford a brown color used in dyeing wool. An inferior sugar can be obtained from the sap, and the leaves, which abound in acrid matter, have been employed as a substitute for Spanish flies. The half-grown fruit, gathered in June, is employed in making excellent pickles, first removing the downiness by scalding in water and rubbing with a harsh cloth. The timber is valuable, being tough and not liable to attack by worms. It is less hard than black walnut (*J. nigra*), but nevertheless may be used for gun stocks, being equally stiff and elastic, for coach panels, wooden bowls, and drawers in cabinet work, and for posts and rails or smaller joists in carpentry. The rich yellow color and close grain make it a very desirable wood for cabinet work or interior finish, forming a marked contrast to black walnut. The species is found in the Canadas, in New England and the middle states, in Kentucky, and on the banks of the Missouri.

BUTTERS, in chemistry, an old name applied to substances having at the ordinary temperature the consistency of butter. The word was originally restricted to anhydrous chlorides of the metals, as for example butter of antimony, bismuth, tin, and zinc. It was afterward applied to vegetable fats, as butter of orris, cacao, cocoa, and nutmeg. The word is at present little used, although retained in some of the pharmacopœias.

BUTTER TREE (*Bassia*), a genus of the natural order *sapotacea*, found in India and Africa, the seeds of which yield a sweet buttery substance. The Indian butter, *fulwa*, or *phulwara* tree (*B. butyracea*) grows wild on the Almora hills in India, the trunk often measuring 50 ft. in height and 5 or 6 ft. in circumference, with broad oval leaves from 6 to 12 in. long, large pale yellow blossoms, and pulpy fruit about the size of a pigeon's egg, containing two or three roundish brown seeds. The fat expressed from the seeds is of the consistency of lard, is white, will keep for months, and is used as a substitute for animal butter, and medicinally for rheumatism and contractions of the limbs. The Indian oil or *illupie* tree (*B. longifolia*), similar to the preceding, grows in plantations on the S. coast of Coromandel, and the fruit by pressure yields an oil used by the natives for soap, in cooking, and in



Leaves, Flower, Fruit, and cross section of Nut.

the sides of the last year's shoots in long green catkins, each flower enclosing 8 to 12 brown sessile stamens; the fertile flowers are 2 to 7 on a terminal downy stalk; the flowers expand

their lamps. The wood is hard and valuable. The *mahwa*, *madhaca*, or *madhooka* tree (*B. latifolia*), native of the mountainous parts of Bengal, furnishes a hard tough wood; the flowers distilled afford a strong intoxicating liquor, and from the seeds is expressed a greenish-yellow oil used in lamps. The *shea* tree, or African butter plant (*B. Parkii*), is



Shea Tree (*Bassia Parkii*).

not cultivated, but grows naturally in great abundance in the equatorial parts of Africa. The fruit resembles the Spanish olive, and from the kernel, dried in the sun and then boiled in water, is extracted a sweet, white, firm butter, which will keep for a year without salting. This is a very important article of African industry and inland trade.

BUTTES, a village of Switzerland, in the canton and 19 m. S. W. of Neuchâtel; pop. in 1870, 1,468. Situated in a narrow valley, and surrounded by high mountains, its position is such that during many months of the year its inhabitants never see the sun.

BUTTISHOLZ, a village and parish of Switzerland, in the canton and 11 m. N. W. of Lucerne; pop. in 1870, 1,596. In its vicinity is a remarkable mound called Engländerhübel, or "Englishman's hillock." It is the grave of a large number of Englishmen, followers of Enguerrand or Ingelram de Coucy, son-in-law of Edward III. and earl of Bedford. This nobleman, in the course of a quarrel with Leopold of Austria, began to devastate the Swiss cantons, when he was defeated by the peasants near Buttisholz, and his troops were cut to pieces (1375).

BUTTMANN, Philipp Karl, a German philologist, born at Frankfort-on-the-Main, Dec. 5, 1764, died in Berlin, June 21, 1829. He finished his education at Göttingen, and in 1789 was appointed assistant librarian to the king of Prussia, but was constrained to turn schoolmaster in order to supply the deficiencies of his salary. In 1808, when the new university was

opened in Berlin, he was appointed one of its first professors. He published three Greek grammars, one etymological, which for a long time were universally used in Germany, and two of which have been translated into English. He was also the author of a *Lexilogus*, especially for Hesiod and Homer (translated into English, 3d ed., London, 1846), and *Mythologica, oder gesammelte Abhandlungen über die Sagen des Alterthums* (2 vols., Berlin, 1828-'9; 2d ed., 1865).

BUTTON, an article used for the fastening of clothing and for ornament. Buttons may be divided into two classes, those with shanks or loops for fastening them to garments, and those without. The manufacture of these useful articles involves various processes, some of them very interesting, and varying according to the materials used. These are metal, horn, shell, glass, mother-of-pearl, jet, vegetable ivory, and whalebone, besides the woven stuffs which are employed for covering button moulds. Birmingham is the most noted place in the world for the manufacture of buttons. In this country it is extensively carried on in Waterbury, Conn., and in Easthampton, Mass. The principal manufactories in the latter place were established about 1848 by Samuel Williston and co., who had previously owned similar establishments in Haydenville, in the same state. They give employment to 250 hands, consume annually \$75,000 worth of stock, and produce from \$200,000 to \$250,000 worth of buttons. In the manufacture of gilt buttons, brass containing very little zinc is used. This is furnished to the buttonmaker in strips, out of which the disks are cut by a machine. The process is so rapid that one person can prepare about 12 gross in an hour. The preparing of the shanks is a distinct branch of trade. They are made of brass wire, a coil of it being put into a machine, in which one end is pushed forward gradually to a pair of shears, and the wire is cut off in small pieces. It is then bent and, being compressed between the jaws of a vice, forms an eye. A small hammer next strikes the two ends, flattening them, and rendering the shank ready for use. The labor of fastening these to the button is performed by women. When properly adjusted, a little solder and rosin are applied to the spot where the two come in contact, which melts on being heated, and on cooling firmly unites them. The buttons, after thorough cleansing, are now ready for being ornamented, either silvered or gilded, as may be desired. If the former, a mixture of silver in solution, salt, and cream of tartar, with some other ingredients, must be stirred together, and the buttons washed with this preparation. For gilding, great care is necessary. An amalgam of gold leaf and mercury is used. This is gently heated, poured into cold water, and then strained through wash leather to remove the excess of mercury. The portion left in the leather is dissolved in dilute nitric acid, and

applied to the buttons. (See GILDING.) To so great a degree of refinement was this art carried in Birmingham, that three pennyworth of gold was made to cover a gross of buttons, so that the thickness of the precious metal could not have exceeded $\frac{1}{1000}$ of an inch. The next process is to free them from all the mercury by heat. For this purpose they are thrown into a wire cage within a furnace constructed in such a manner that the mercurial vapor is conducted into a vessel containing water, in which it is condensed. This process is termed drying off. Burnishing completes the work.—As the fashion of buttons is constantly changing, new forms and new materials are always coming into use. Moulds covered with silk, velvet, or other material, have in a measure superseded gilt buttons. The process of making covered buttons is very ingenious, and a full description of it would occupy many pages. Most of the machines are worked by hand, or rather by a treadle, while others are moved by power, and have many beautiful automatic movements. The first covered buttons were made upon wooden moulds which were turned in a lathe, the cloth being simply stretched over them and sewed together upon the back. Since the introduction of machinery in the manufacture, iron moulds, or shells, have been substituted, as being cheaper and more easily worked. The iron used comes in thin sheets called tagger's iron, and is made in Europe expressly for buttons. The shell is cut and formed with a die moved by steam power, and resembles a cover to a cylindrical box. One machine will cut and form 50 gross in an hour. The shell and cover form the face of the button. There are two kinds of covered buttons, one called silk back and the other iron back. The former is the latest invention and is the most in use. The silk-back button is made in a die worked with a treadle. It is first formed in two parts, the face and the back; the face consisting of the shell and the cover, which latter may be of silk, lasting, velvet, or whatever material may be desired, while the back is composed of four layers: first an iron blank, which is a concave circular piece of tagger's iron, somewhat smaller than the shell; next a blank made of pasteboard; then a blank of canvas; and over this the silk back. These parts are each formed in a separate die, and then by a suitable contrivance are brought together, when the back is introduced into the shell and cover, the cover being at the same time turned over the edge of the shell, while both are forced down firmly over the back. After this they are placed in a press by which the centre of the back is formed into a nipple which answers the purpose of a shank for sewing on. The iron-back button, instead of having a simple disk or iron blank in the back, has a ring or collet of tagger's iron, through which a nipple of the cloth is forced to form the shank. This collet forms the outside of the back, while in the silk-back

button the iron blank is the inner layer. The back, instead of containing four layers, only has three, an inner one of paper, a second of cloth, the third being the collet. The method of joining the two parts is similar to that for the silk-back button, the back being introduced into the face, and the latter turned down over it. All the machinery for these processes is very simple, though beautifully adapted to perform the work for which it is intended; but the machinery for making buttons for braces is perhaps the most ingenious and interesting. The movements are nearly all automatic, the only work which is done by hand being the placing of the face and back of the button in a long tube by which they are fed to the closing machine, and in a subsequent part of the process the placing of them in the dies in which the holes are pierced and countersunk. These buttons, after the parts are stamped out and placed together, pass in process of making three automatic machines: the closing machine; the stamping machine, which gives shape to the buttons and stamps upon them whatever letters or device they are to bear; and the piercing and countersinking machine, which for simplicity and true mechanical ingenuity is scarcely excelled by any other kind of machinery.—A kind of button, having an eyelet or shank by which it is fastened to the garment without sewing, has recently come into use. The machinery by which it is manufactured is also very ingenious and perfect in the performance of its work, and a great number of buttons can be turned out at a very small cost. The face and back of the button are made very much in the same way as for other buttons; but in place of holes or a cloth shank, a cone is formed in the centre which serves to spread and rivet the eyelet or shank when the button is fastened to the garment, which is done by a machine worked by hand or by a treadle.—Vegetable ivory buttons are made in large quantities at Leeds, Mass., and at other places in this country. The nuts are kiln-dried and sawed into slabs of the proper thickness, and from these the buttons are cut by a lathe, after which holes are drilled in them either by a power or hand lathe. The material can be dyed of any desired color with as much facility as cloth, and will receive a high polish by friction. Horn, bone, and ivory buttons are made in a similar manner. Buttons are also made of india-rubber composition, of various forms, some being very beautiful. They are made with shanks or eyes and with holes. In either case the process is very simple, and is performed by means of a die and under considerable pressure.

BUTTON, Sir Thomas, an English navigator in the early part of the 17th century, the successor of Hudson in exploring the N. E. coast of North America. He sailed in 1612 with two vessels, the *Resolution* and the *Discovery*, passed through Hudson strait, and was the first to reach land on the W. coast of the bay.

The point which he touched was in lat. 62° and was named by him Carey's Swan's Nest. Being obliged to winter in this region, he selected a position near the mouth of a river, first named by him Nelson's, after the master of his ship, and gave his own name to a neighboring bay. Every precaution was taken against cold and icebergs, yet the severity of the climate occasioned much suffering to his crew, and was fatal to some of them. During the next summer he explored and named several places on the coast of Hudson bay, and advancing to lat. 65°, became convinced of the possibility of the northwest passage. He returned to England in the autumn of 1613, and was made a knight. He never published an account of his voyage; but an extract from his journal is given by Purchas.

BUTTONWOOD. See PLANE TREE.

BUTTS, a central county of Georgia, bounded E. by the Ockmulgee river, and watered by several creeks; area, 240 sq. m.; pop. in 1870, 6,941, of whom 3,445 were colored. The surface is somewhat uneven, and the soil fertile. The chief productions in 1870 were 23,425 bushels of wheat, 126,839 of Indian corn, 19,880 of sweet potatoes, and 2,926 bales of cotton. There were 661 horses, 1,819 milch cows, 2,366 other cattle, 1,568 sheep, and 6,223 swine. Capital, Jackson.

BUTURLIN, Dmitri Petrovitch, a Russian military writer, born in St. Petersburg in 1790, died near there, Oct. 21, 1850. He participated as an officer in the campaign of 1809 against Austria, and that of 1812 against Napoleon, and attended as Russian military agent that of the duke of Angoulême in Spain in 1823. He afterward became major general, and in the war of 1828-'9 against Turkey he was quartermaster general. He is especially known by his works on the campaign in Italy in 1799 (1810), that of 1813 in Germany (anonymous, 1815), the peninsular war (1817), the Russian campaigns in the 18th century (4 vols., 1820), the campaign of 1812 in Russia (2 vols., 1824), and on Russia in the beginning of the 17th century (3 vols., 1839-'46). He published his earlier works in French, and the later in Russian.

BUTYRIC ACID, a volatile fatty acid discovered by Chevreul among the products of the decomposition of butter. Its formula is now written $C_4H_8O_2$. Butyric acid has been found ready formed in human perspiration, in flesh juice, guano, excrements, putrid yeast, bad cider, dung heaps, accumulations of decomposing organic matter, in cod liver oil, and in beetles; and it is the substance which gives the disagreeable smell to rancid butter. It combines with bases to form salts, and also exists as butyric anhydride. It is a colorless, mobile liquid, of a peculiar offensive odor, having an acid taste and highly caustic property, and a specific gravity of 0.96. It can be prepared in a great variety of ways; among others, from butter, sugar, and by the action of

hydriodic acid on succinic acid. Bromo-butyric acid, butyric aldehyde, and butyric chloride have been prepared, but they possess little practical importance.

BÜTZOW, a walled town of Germany, in the grand duchy of Mecklenburg-Schwerin, 26 m. N. E. of Schwerin, at the confluence of the Warnow and the Nebel; pop. about 5,000. It contains a Gothic church of the 13th century, a new town hall, an old episcopal palace now used as a prison, many breweries, an iron foundry, and manufactories of brandy, oil, playing cards, straw hats, and machinery.

BUXHÖWDEN, Friedrich Wilhelm, count von, a Russian general, born at Magnusdal, on Mör., Sept. 14, 1750, died at his estate of Lobde in Esthonia in 1811. He served for many years against the Turks, in 1789 was made general, and in the next year conducted with success the campaign against the Swedes. He commanded a division of the army in the war against Poland, was governor of Warsaw from 1794 to 1796, and afterward military governor of St. Petersburg. Under Paul he was for a short time in disgrace and retired to Germany, but was restored to his offices upon the death of that czar. At Austerlitz he commanded the left wing of the Russians, and in 1808 led a successful expedition against the Swedes.

BUXTON, a market town and watering place of Derbyshire, England, 80 m. W. N. W. of Derby, and 20 m. S. E. of Manchester; pop. in 1871, 6,229. It has long been famous for its mineral waters. The principal group of buildings is the crescent, erected by the duke of Devonshire in 1780-'84; it is 270 ft. long, three stories high, the lower forming a colonnade, and is chiefly occupied by two hotels, one of which is the public ball room. Opposite this is St. Ann's well, of which the water is pure and tasteless, but has a stimulating property; the temperature is 82° F. The waters, which are saline, sulphurous, and charged with nitrogen, are valuable chiefly in cases of chronic gout, rheumatism, and disease of the digestive organs. There are eight hotels, five public walks, several chapels, schools, and charitable institutions. From June to October there is a large influx of visitors. Near by are many natural curiosities, among which, a mile distant, is Pool's Hole, a remarkable stalactite cavern. Two miles from Buxton is the Diamond hill, so called from the crystals found there, known as Buxton diamonds. In the neighborhood is Chee Tor, a huge mass of limestone more than 300 ft. high.

BUXTON, Jedidiah, an English calculator, born at Elmlton, Derbyshire, in 1705, died about 1775. He could not write, but possessed great facility in performing mental arithmetical calculations. He seemed unable to consider anything save with respect to the number of its constituent parts. After hearing a sermon, he remembered nothing of it except the exact number of words it contained; and if the size of an object were named, he would instantly

declare how many hairs' breadths it contained. He scarcely had a system of calculation, as, from his own obscure explanation, his process was clumsy and circuitous, though extremely swift. He walked to London to see the king, and was examined by the royal society, who asked him: "In a body whose three sides are respectively 23,145,789 yards, 5,642,732 yards, and 54,965 yards, how many cubical eighths of an inch are there?" His reply, calculated at once without one figure having been written down, was found to be correct. Except with respect to this mastery of numbers, his intellect was much inferior to that of ordinary men.

BUXTON. I. Sir Thomas Fowell, a British legislator and philanthropist, born at Castle Hedingham, Essex, April 1, 1786, died at his residence near Aylsham, Norfolk, Feb. 19, 1845. He received his education at Donnybrook, and subsequently at Trinity college, Dublin. In 1808 he became a clerk, in 1811 a partner, and soon after principal manager of the brewery of Truman, Hanbury, and co., of London. In 1816 he took an active part in a public meeting, by which £44,000 was collected for the relief of the poor in the manufacturing district of Spitalfields. In conjunction with Mrs. Elizabeth Fry, his sister-in-law, and Mr. Hoare, his brother-in-law, he personally examined into the state of British prisons, and published the result of his inquiry. From this came the prison discipline society, which led to the removal of many of the evils pointed out. From 1818 to 1837 he was member of parliament for Weymouth. Prison discipline, the amelioration of the criminal law, the suppression of lotteries, the abolition of Hindoo widow-burning, and the abolition of slavery were subjects on which he was always earnest in debate. He cooperated with Mr. Wilber-

force in the anti-slavery movement, and succeeded him as recognized parliamentary leader of the party. After he left parliament he employed his leisure in writing a book against the African slave trade. In 1840 he was made a baronet. II. Charles, son of the preceding, born in 1822, died in August, 1871. He was educated at Trinity college, Cambridge, where he graduated in 1843; was returned to parliament in 1857 for Newport, Isle of Wight, in 1859 for Maidstone, and in 1865 for East Surrey. He edited and completed the autobiography of his father (London, 1848), wrote "Ideas of the Day on Policy," and contributed to the "Cambridge Essays."

BUXTORF. I. Johann, a German Hebraist, born at Kamen, Westphalia, Dec. 25, 1564, died of the plague in Basel, Sept. 13, 1629. He was professor at Basel for 38 years, and the most eminent oriental scholar of his day. His most important works are the Hebrew Bible with the rabbinical and masoretic notes, a Hebrew grammar, a Hebrew and Chaldee, and a Chaldee, Talmudical, and rabbinical lexicon, the last edited by his son. II. Johann, son of the preceding, born in Basel, Aug. 13, 1599, died there, Aug. 16, 1664. He succeeded his father in the chair of Hebrew at Basel in 1630, and occupied it for 34 years until his death. The same chair was filled by his son and his nephew successively during 68 years longer. He published a Chaldee and Syriac lexicon, a Latin translation of Maimonides's *Moreh nebhukhim*, and the *Concordantia Bibliorum Hebraicorum*, begun by his father.

BUYUKDEREH, a village of European Turkey, on the W. side of the Bosphorus, 9 m. N. N. E. of Constantinople, with which it is connected by steamers. It consists of an upper and a lower village. The latter contains many fine resi-



Buyukdereh.

dences and gardens and the magnificent palace of the Russian embassy. Together with the adjoining Therapia, it is the favorite resort of foreign ministers and wealthy families during the summer, the promenade along the quay being very attractive. The valley of Buyukdereh extends inland for about 8 m.

BUZZARD, the name properly given to the *buteoninae*, a subfamily of the birds of prey of the family *falconidae*. Their general form is heavy; their flight is vigorous and long continued, but less rapid than that of the hawks and falcons; the wings are long; the bill is curved from the base, and strong. The principal genus is *buteo* (Cuv.); this has the edge of the upper mandible lobed, with wide and long wings, the 4th and 5th quills usually the longest; tail moderate and wide; tarsi robust and covered with scales; toes short, with strong claws. It contains about 30 species, in various parts of the world. The red-tailed hawk or buzzard (*B. borealis*, Gmel.) is about 2 ft. long, with an extent of wings of about 4 ft.; the color above is dark brown, with lighter edgings; tail bright rufous, narrowly tipped with white and a subterminal black band; upper tail coverts yellowish white with brown spots and bands; beneath pale yellowish white, with longitudinal lines and spots of fulvous brown; throat white, with narrow brown stripes; tail below silvery white. The body is large and muscular. Like other buzzards, it protrudes the claws beyond the head in seizing prey; the flight is slow and sailing, at a moderate height, accompanied by a mournful cry; after seeing its prey, it generally alights on a tree, from which it descends with great rapidity and rarely failing accuracy. It preys upon hares, squirrels, grouse, and smaller birds; it frequently visits the poultry yard in search of chickens, goslings, &c., and is consequently often called hen hawk by the farmers; it is very difficult to approach with a gun. The red-shouldered buzzard (*B. lineatus*, Gmel.) is about 20 in. long, with an extent of wings of about 3½ ft.; its specific mark is the bright rufous color of the lesser wing coverts; the upper parts are brown, mixed with rufous on the head, and with white spots on the wings; under parts pale orange rufous, with white spots and bars; tail brownish black, with about five bars and a tip of white. The young birds, described as the winter hawk (*B. hyemalis*, Gmel.), are yellowish white below, with dark brown spots and stripes; ashy brown above, white-spotted; tail ashy brown, silvery white below, and with numerous pale brownish and rufous white bands above. This buzzard is found abundantly east of the Rocky mountains, being replaced to the westward by the *B. elegans* (Cassin), in which the under parts are much darker red. It prefers woods, in which it finds squirrels, hares, grouse, and other animals of similar size; it is one of the most noisy of the genus. The broad-winged hawk (*B. pennsylvanicus*, Wilson) is about 17 in. long, with an extent of wings of 3 ft.; the color above is umber brown, the

feathers white at the base on the hind neck; throat white, with brown streaks; breast with band and spots of dusky ferruginous; rest of under parts white, with reddish spots on the



European Buzzard (*Buteo vulgaris*).

sides; tail dark brown, narrowly tipped with white, with one wide and several narrower bands of white near the base. It is found in eastern North America. Its flight is easy and performed in circles, and often in a gliding manner for a short distance with closed wings; it feeds on small quadrupeds, birds, and reptiles, and sometimes on insects; it rarely secures birds on the wing. The European buzzard is the *B. vulgaris* (Cuv.).—The genus *archibuteo* (Brehm) differs from the last chiefly in having the front of the tarsus densely feathered to the toes. The rock-legged hawk or buzzard (*A. lagopus*, Gmel.) is about 23 in. long, with an extent of 4½ ft.; the wings are long, the tail short, the tarsus densely feathered in front to the toes, and body robust.



Black Hawk (*Archibuteo Sancti Johannis*).

the upper parts are generally dark brown much lighter on the head, with a white patch on the latter; under parts white, with stripes and spots of brown; tail white at the base.

with a wide subterminal band of black, and two others alternating with two of light cinereous. It inhabits all of temperate North America, and cannot be distinguished, according to Baird, from the European rough-legged species. It flies slowly, sailing often in circles; its habits and food are as in the species above described. The black hawk (*A. Sancti Johannis*, Gmel.) is a little larger than the last, and in the adult of glossy black plumage, often with a brown tinge, and with white spots on the forehead, throat, and occiput; tail with a well defined white bar, and irregularly marked with the same toward the base; inner webs of quills white, conspicuous from below during flight; tarsi densely feathered in front. It is found in the eastern and northern parts of America; chocolate-brown specimens are frequently met with.—The buzzards seek their food late in the evening, and in that respect closely resemble the owls, as well as in their low, slow-sailing flight just above the tops of the long meadow grass, which they almost fan with their wings, as they seek in it their prey of small quadrupeds, such as field mice and ground squirrels, the inferior reptiles, newts, frogs, lizards, and snakes, as well as the young of game, both winged and fur-bearing, among which they make sad havoc. These birds must not be confounded with the American vultures, of which there are two species found in the United States, the *cathartes aura*, or turkey buzzard, as it is erroneously called, and the *C. atratus*, or carrion crow, as it is misnamed in the south. (See TURKEY BUZZARD.)

BUZZARD'S BAY, on the S. coast of Massachusetts, 30 m. long by a mean width of 7 m., contains the harbors of New Bedford, Fair Haven, Mattapoisett, Sippican, and Wareham. It is sheltered from the ocean, and separated from Vineyard sound, by the Elizabeth islands.

BYLES, Mather, an American clergyman, born in Boston, March 26, 1706, died there, July 5, 1788. He graduated at Harvard college in 1725, was ordained minister of the Hollis street church, Boston, in 1733, and received the degree of doctor of divinity from the university of Aberdeen in 1765. He remained loyal during the revolution, and was compelled on that account to resign his pastorate in 1776. The following year he was denounced in town meeting as an enemy to his country, arrested, imprisoned in a guard ship, and sentenced to banishment, which was afterward commuted to confinement to his own house, from which he was soon released. Many of his sermons were published separately from 1729 to 1771. He also published "A Poem on the Death of George I." (1727); "A Poetical Epistle to Gov. Belcher, on the Death of his Lady" (1736); and "Miscellaneous Poems" (1744). His reputation rests mainly upon his wit, which exhibited itself chiefly in puns.

BYNG, John, a British admiral, born in 1704, executed at Portsmouth, March 14, 1757. In 1756, Minorca being menaced by the French,

Admiral Byng was appointed commander of a squadron consisting of 10 ships of the line, with which he proceeded to its relief. After arriving in the Mediterranean, finding his equipments inadequate to the service required, he sailed for Gibraltar to get provisions and refit. He now learned that the French had succeeded in landing 19,000 men in Minorca, and had reduced nearly the whole of the island. Although a council of war pronounced against the attempt, Byng made an effort to establish communication with the garrison, which, after an indecisive engagement with the French fleet, proved unsuccessful. For his conduct on this occasion he was superseded, and on his return home was brought to a court martial. After a long trial he was found guilty of cowardice in the presence of the enemy, and sentenced to be shot, but recommended to mercy. His general unpopularity and the rancor of his political enemies prevailed against this recommendation, and the sentence was carried into execution. Macaulay brands his punishment as "altogether unjust and absurd."

BYNKERSHOEK, Cornelis van, a Dutch jurist, born at Middelburg, May 29, 1673, died at the Hague, April 16, 1743. He was educated at the university of Franeker, practised as an advocate at the Hague, and was for many years president of the supreme council of Holland, Zealand, and West Friesland. He wrote *Observationes Juris Romani* (Leyden, 1710), and *Questiones Juris Publici* (1737), and compiled a digest of Dutch law. His complete works have been published in 2 vols. fol. (Geneva, 1761; London, 1767).

BYRD, William, an American lawyer, born at Westover, Va., March 28, 1674, died Aug. 26, 1744. Having inherited an ample fortune, he was sent to England for his education, was called to the bar at the Middle Temple, studied for some time in the Netherlands, visited the court of France, and was chosen fellow of the royal society. He was for a long time receiver general of the revenue in Virginia, three times colonial agent in England, for 37 years a member, and finally president of the council of the colony. In 1728 he was one of the commissioners appointed to fix the boundary between Virginia and North Carolina. "The Westover Manuscripts," written by him, containing an account of this survey, as well as of travels and observations elsewhere, were published at Petersburg in 1841. In 1738 he laid out the cities of Richmond and Petersburg, on land owned by himself. He possessed the largest private library in America.

BYRGIUS, Justus (properly JOSEF BÜRGER), a Swiss inventor, born at Lichtensteig, Feb. 28, 1552, died at Cassel in 1633. In 1579 he was invited to Cassel, and attached to the observatory there. He constructed a celestial globe, which attracted the attention of Rudolph II., who invited him to enter his service, which he did in 1604, and after the emperor's death in 1612 remained in Vienna till 1632. He drew

up tables similar to those afterward published by Napier in his "Canon" of logarithms, and invented a sector and pendulum clock.

BYROM, John, an English poet, born at Kersall, near Manchester, in 1691, died in Manchester, Sept. 28, 1768. He was educated at Trinity college, Cambridge, studied medicine in France, and became a member of the royal society. Having married against the wishes of his family, he was deprived of all means of support, and maintained himself by teaching a system of stenography of his own invention, until the family estates devolved upon him by the death of his elder brother. In the latter part of his life he was a disciple of Jacob Boehm. His reputation rests mainly upon his pastoral "Colin and Phoebe," beginning "My time, O ye muses, was happily spent," which appeared in the "Spectator," No. 608. His works were published at Manchester in 1773 (2 vols. 8vo), and at Leeds in 1814; and his "Private Journal and Literary Remains" at Manchester, 1854-'8.

BYRON. I. George Gordon, lord, an English poet, born in London, Jan. 22, 1788, died at Missolonghi, Greece, April 19, 1824. His grandfather, Admiral John Byron, was the younger brother of William, fifth Lord Byron. His father, John Byron, was a captain in the guards, whose reckless dissipation gained for him the name of "mad Jack Byron." At the age of 28 he eloped with Amelia d'Arey, daughter of the earl of Holderness, in her own right Baroness Conyers, and wife of the marquis of Carmarthen, afterward duke of Leeds. They went to France, where she died in 1784, leaving a daughter Augusta, afterward Mrs. Leigh. In 1786 John Byron married Catharine Gordon, a Scottish heiress, with a fortune of about £25,000, of which £3,000 was settled upon her, and most of the remainder went to pay her husband's debts. They went to France, and returned to England just before the birth of their son. Augusta, then six years old, was sent to her grandmother, the countess of Holderness, by whom she was brought up, and Mrs. Byron and her infant went to Aberdeen, their only means of support being £150 a year, the interest of the sum which had been settled upon her. Her husband remained awhile in London, but at length visited Aberdeen, and induced his wife to borrow a few hundred pounds for him, with which he set out for Paris, but died on the way in 1791. Mrs. Byron was ungainly in person, with a narrow intellect and violent temper. At the time of Byron's birth the bones of his right foot were partially displaced, and he grew up lame. In her fits of passion she would taunt him as a lame brat, while in her moods of fondness she would stifle him with caresses, and praise the beauty of his eyes. They remained at Aberdeen till 1798, when his great-uncle, William, Lord Byron of Rochdale and Newstead Abbey, died without direct heirs, and the lame boy succeeded to the titles and estates. The estates

were large, but much encumbered, the net income from them for some years amounting to not more than £1,500. Lord Byron, as a minor peer, became a ward of chancery, his guardian being his distant kinsman the earl of Carlisle. He was sent to school at Dulwich, where some attempts were made to restore his foot to its proper position. These were only partially successful; though there was no marked deformity, the ankle remained weak, and he always walked with a slight limp. Still, as he grew up, he excelled in athletic exercises: was a fair cricketer, a capital swimmer, and an expert boxer. In 1800, at the age of 12, he was sent to Harrow school, where he remained five years. He was a careless student, but an omnivorous reader, especially of history and fiction. During a six weeks' vacation, while in his 16th year, he fell in love with his distant relative Mary Anne Chaworth, whose great-uncle had been killed by his own great-uncle. She was two years his senior, and soon after married another. Byron was wont to say, in prose and verse, that this boyish passion was the turning point of his life. In 1805 he went to Trinity college, Cambridge, and in the next year printed for private circulation a small volume of poems. Most of these, with many additions, are contained in the "Hours of Idleness," which he published in 1807. Byron was much elated at some favorable notices which appeared of this volume, and at once set about writing an epic, a novel, and a satire. But a contemptuous criticism in the "Edinburgh Review" made him exceedingly angry. He determined to have his revenge, and so set himself at work to finish the satire which he had begun months before, and published months after (March, 1809), under the title of "English Bards and Scotch Reviewers." Some of the keenest passages which appear in this satire were added in a second edition published a few weeks later. Byron came of age in January, 1809, and prepared to take his seat in the house of peers; but there was some difficulty in proving the marriage of his grandfather, Admiral Byron, so that he did not take his seat till March. The last two years had been passed in coarse dissipations at Cambridge and London, and he was not recognized by a single member of his order who would introduce him to the house of peers. The earl of Carlisle, his kinsman and guardian, refused to perform this act of formal courtesy, and was repaid by Byron with a lampoon interjected into his satire. Upon taking his seat, Byron, as far as present income went, was the poorest peer of the realm. His great-uncle had separated from his wife, quarrelled with his son and grandson, both of whom he survived, and seems to have set himself at work to destroy the value of the inheritance which would fall to his heirs. He cut down the timber at Newstead Abbey, and suffered the house to fall into decay. He sold the more valuable estates of Rochdale, for which he could give no legal title.

and spent the money in idle whims. Suits at law were instituted by Byron to recover this property, which after many years were successful, and toward the close of his life he became a rich man; but on coming of age, with an income of £1,500, he owed £10,000. His dissipations had impaired his health; his narrow fortunes had rendered England distasteful to him; and in June, 1809, he set out for a long tour in the East. Barely touching at Lisbon, he went into Spain as far as Cadiz and Seville, and thence by way of Gibraltar and Malta to Albania, where he commenced the composition of "Childe Harold." The year 1810 and a part of 1811 were spent mainly in Greece, where he wrote "Hints from Horace" and "The Curse of Minerva," and completed the first and second cantos of "Childe Harold." During this time he scarcely saw a fellow countryman, and was fond of hinting afterward that he had been engaged in strange adventures, shadowed forth in some of his later poems, of which pirates and other outlaws are the heroes. He was on the point of sailing for Egypt when remittances from home failed, and he returned to England in July, 1811, after an absence of a little more than two years. He had scarcely landed before he began to prepare to print the poems which he had written during his absence. He showed the "Hints from Horace" to his kinsman Robert Charles Dallas, who was disappointed with them. Byron then said that he had written many stanzas in the Spenserian measure, describing the countries which he had visited; that a friend who had seen the verses had found little to praise and much to condemn; but if Dallas wanted the rhymes, he was welcome to them. Dallas took the manuscript, read it, and urged its immediate publication. This manuscript was only the rough draught of the first and second cantos of "Childe Harold;" for while the poem was passing through the press many feeble stanzas were expunged, and many of the finest passages written and added. Byron meanwhile had not gone to see his mother, from whom he had parted more than two years before in no pleasant way. Almost her last words were an imprecation that he might become as deformed in mind as he was in body. A month after his arrival at London he learned that she was ill, and the next day that she was dead. She had died from the effects of a fit of rage arising from a quarrel with a tradesman. "Childe Harold" passed slowly through the process of printing, and almost of rewriting. It was published Feb. 29, 1812. He had made his first speech in the house of peers two days before, in opposition to a bill imposing severe penalties upon weavers who had broken the newly invented weaving machines. The speech was written out and recited, and, notwithstanding its schoolboy manner of delivery, excited some attention. Burdett said that it was "the best speech made by a lord since the Lord knows when;" and

Lord Harrowby declared that "some of the periods were very like those of Burke." Byron spoke twice more in the house of peers, but these speeches were of no account. The publication of the first two cantos of "Childe Harold" formed an epoch in literature. He became at once a celebrity. As he himself said, "I awoke one morning and found myself famous;" and not only famous but the fashion. His table was loaded with letters from statesmen and philosophers, and with billets from women of high rank and easy virtue; Holland house opened its doors to him; the prince regent requested a special introduction; instead of the prize fighters and groomsmen who had heretofore been his associates, Sheridan and Moore and Rogers became his friends and companions. Notwithstanding his slight lameness and his constitutional tendency to obesity, he had grown to be the handsomest man of his day. Heretofore his way of life had not been worse than that of other young men of his rank and time; but he now trod the downward path with swift steps. For weeks he lived upon fare which would have starved an anchorite; then for weeks he plunged into the wildest debauchery. His *liaisons*, mostly with married women almost old enough to be his mother, were numerous, and report multiplied them tenfold. Though poor and loaded with debt, he was lavish in giving. To Dallas he presented the £600 which Murray paid him for "Childe Harold," to another person he gave £500, and so on. During the remainder of the year in which "Childe Harold" was published he wrote little. In 1813 he fairly began that career of literary activity which lasted nearly through the remaining 11 years of his life. In May, 1813, "The Giaour" appeared, and before another year had passed he had written "The Waltz," "The Bride of Abydos," "The Blues," "The Corsair," and several smaller poems. He then declared his intention to write no more poetry, and to suppress all that he had written; but within three weeks he commenced "Lara." Meanwhile Newstead Abbey had been sold for £140,000, the purchaser paying down £25,000, to be forfeited unless he should meet the succeeding payments. He was unable to raise the money, and Byron retained the £25,000, with which he paid some of his debts, but contracted more new ones. His friends grew alarmed, and urged him to marry. Any wife might mend his morals; a rich wife would repair his fortunes. He was jaded with excess, and hearkened to the suggestion. Eighteen months before he had been struck with the beauty and modesty of Anne Isabella Milbanke. She was the daughter of a baronet with large though somewhat encumbered estates; she was moreover the presumed heiress of an uncle, Noel, Viscount Wentworth, whose landed estates yielded £8,000 a year. Byron proposed to her and was refused; but a correspondence sprang up from which he inferred that a second offer would be accepted. He was inclined to renew

the offer, but a confidential friend told him that Miss Milbanke's present fortune was not sufficient to relieve his necessities, and advised him to write to another heiress proposing marriage. Byron agreed, wrote, and was refused. He thereupon wrote to Miss Milbanke, and was accepted. The marriage took place Jan. 2, 1815, Byron being 27 years of age, his wife four years younger. Byron's creditors, learning that he had married an heiress, soon began to press for payment of their debts. His wife's fortune melted away; in a few months ten executions were placed in his house, and he was saved from personal arrest only by his privilege as a peer. His daughter Ada was born Dec. 10, 1815. During this year he wrote "The Siege of Corinth," "Parisina," and several smaller poems. His wife had hardly risen from childbed when Byron insisted in writing that she should return to her father's house. She did so, Jan. 15, 1816, and on Feb. 2 her father wrote to Byron proposing a formal separation. Byron refused, but upon being threatened with legal proceedings consented. The real grounds for the separation are yet a matter of question. Apart from notorious infidelity on his part, and alleged ill treatment in other respects, it was whispered at the time that he had been guilty of incest with his half sister Augusta. This charge has been definitely reiterated within a few years by Mrs. Harriet Beecher Stowe, upon the authority of statements made to her in 1856 by Lady Byron. At the time of the separation, however, and subsequently, Lady Byron alleged nothing more than that Byron was guilty of great harshness; that he had declared to her that incestuous intercourse between himself and his sister had occurred; that she then believed him to be insane, and upon that supposition would have consented to a reconciliation. She treated Augusta with great kindness, and wrote to her in terms of confidence and affection which continued during the remainder of Byron's life, and apparently for several years after. Mrs. Leigh's whole life and character renders the supposition of her guilt improbable. She was six years older than Byron, nowise especially attractive, and at the time of the alleged crime she had been married eight years, and was the mother of four children. She died in 1851, at the age of 67 years, and, save for the rumor of a whole generation before, her reputation was never called in question. But there had been a sad episode in her domestic life. Her fourth daughter, Medora, born about the time of the marriage of Byron, entered about 1830 upon criminal relations with Henry Trevanion, the husband of her oldest sister, Georgiana. Medora, disowned by her relatives, fell into great distress, and was in the end befriended by Lady Byron, who as late as 1840 told her that she had learned that Lord Byron, and not Col. Leigh, was her father.—Never was there a popular revulsion so sudden and fierce as in the case of Byron after the separation between

him and his wife. Four years before he had become famous in a day; in a day he now found himself an outcast. He was lampooned in the newspapers, threatened with being hanged in the theatres and mobbed in the streets. For a month he tried to brave it out, and then fled from his country, never to return. From England he went to Brussels, and thence travelled leisurely up the Rhine to Switzerland. He went in state, with a physician and three servants, in a carriage built after the model of that of Napoleon captured after the battle of Waterloo, having within it a bed, library, and dinner service. The money to pay his lavish expenses probably came from the family of his wife. He reached Geneva in May. Here he met Shelley, with his infant son, Mary Wollstonecraft Godwin, its yet unwedded mother, and Jane Clermont, a young woman, daughter of a widow whom Godwin had married after the death of Mary Wollstonecraft. Byron had never before seen either of them; but in barely nine months Miss Clermont became the mother of his daughter Allegra. This child when 20 months old was sent to him at Venice, and he provided for her support; she died at the age of five years. Byron sailed on the lake of Geneva, made excursions among the Alps, wrote the third canto of "Childe Harold," "The Prisoner of Chillon," and several minor poems, began "Manfred," and commenced a novel afterward written out from memory by his physician, Polidori, and published in 1819 under the title of "The Vampire." Byron's sketch was written in consequence of an agreement that he, Shelley, and Mary Godwin should each write a ghost story. Her story, the only one ever completed, was "Frankenstein." In October, 1816, Byron left Switzerland, leaving behind his unborn child and his mother, and in November took up his abode in Venice, where he remained three years. He hired apartments in the house of an elderly Venetian merchant, who had a young wife, and in ten days Byron entered upon a *liaison* with her which lasted for months. He soon hired a palace, which he converted into a harem, the inmates of which belonged mainly to the lowest class of Venetian women. During these three years he studied the Armenian language, finished "Manfred," wrote "The Lament of Tasso," "Beppo," the "Ode on Venice," "Mazeppa," the fourth and noblest canto of "Childe Harold," four cantos of "Don Juan," many smaller poems, and numerous letters filled with wit and ribaldry. But his excesses began to tell upon him; his hair grew thin and gray, and he seemed to be fast approaching his end. Having somewhat amended his way of life, and partially recovered his health, Byron, in April, 1819, happened to meet with Teresa Guiccioli. She was the daughter of Count Gamba, and some months before, at the age of 16, had become the third wife of Count Guiccioli, a wealthy nobleman of the Romagna, more than 60 years old.

Byron and she appear to have fallen in love with each other at first sight. Byron broke up his harem and attached himself to her. Toward the close of the year 1819 the old count took his young wife to his home in Ravenna. She fell sick, and it was thought nothing could save her life but the presence of her lover. Her father, brother, and husband urged him to come. He went, and took up his residence in her husband's palace, where he remained for about two years, openly recognized as the lover of the countess. During this time he translated the first canto of the "Morgante Maggiore" of Pulci, the "Francesca of Rimini" of Dante, wrote "Marino Faliero," "Sardanapalus," "The Two Foscari," "Cain," "The Vision of Judgment," "Heaven and Earth," "The Prophecy of Dante," the fifth canto of "Don Juan," and began "Werner" and "The Deformed Transformed." Most of his poetry of this period, and that which was to follow, shows a great falling off in power. There are indeed passages equal to anything which he ever wrote; but as a whole the verse is heavy and loose. While in England his excesses in drinking had been occasional; toward the close of his life in Venice they had grown more and more constant; now they were habitual, and gin took the place of wine. After more than a year Count Guiccioli began to take umbrage at the relations between his wife and Byron, and demanded that she should give him up. She demurred, thought it hard that she must be the only woman in Romagna who might not have an *amico*, and demanded a formal separation from her husband. This was granted by the pope, upon condition that she should reside at a castle belonging to her father, 15 miles from Ravenna. She could not long endure the separation from Byron, and soon went back to her father's house at Ravenna. Toward the close of 1821 Italy was in a ferment of revolution. The two Gambas, father and son, were among the leaders of the carbonari; Byron joined with them, promising pecuniary aid. He was now a rich man. He had recovered the Rochdale estates, and sold Newstead Abbey for cash; the mother of his wife had died, and she had come into possession of the Noel estate, a portion of the income from which had been settled upon Byron at his marriage. We now find him negotiating to lend £100,000 to the earl of Blessington upon the security of property in Ireland; the negotiation fell through, because his agents were not satisfied with the security. Not long after we find him boasting that his surplus income exceeded the salary of the president of the United States. At this time, by the advice of his trustees, he formally assumed the name of Noel in addition to his own. The uprising in Italy proved a failure. The Gambas were obliged to leave the Romagna. Byron and the countess Guiccioli accompanied them, and in November, 1821, they took up their abode in Pisa, where they remained

nine months, when they removed to Genoa. After leaving Ravenna Byron finished "Werner" and "The Deformed Transformed," wrote "The Age of Bronze," "The Island," and "Don Juan," cantos vi. to xvi., which completed the work as far as ever published; although the countess Guiccioli states that he subsequently wrote five more cantos, bringing the poem to an edifying conclusion. Several of his later poems were first published in "The Liberal," a periodical started by him in conjunction with Shelley and Leigh Hunt, of which only four numbers were issued. He had also written his "Memoirs," the manuscript of which he presented to Moore, who sold it to Murray the publisher for £2,000, with the condition that it should not be published until after Byron's death. This manuscript was repurchased, and finally burned; but it is affirmed that several copies were made and are still in existence. Byron had now grown weary of the monotonous life which he was leading. He had years before said that if he lived he would some day do something besides writing poetry. Greece had now risen against the Turks, and Byron resolved to join the Greek cause. He seems to have had in mind to place himself at its head, and perhaps to become king of Hellas. He advanced considerable money to the Greek committee, promised more, and on July 14 sailed from Genoa for the Greek islands. The two Gambas, father and son, accompanied him. The countess Guiccioli remained behind. After Byron's death she appears to have returned to her husband; at all events, after his death she received an annuity from his estate. About 1833 she appeared in England and France. In 1851 she married the French marquis de Boissy, who died in 1866, and was wont to speak of her as "my wife, formerly mistress of Lord Byron." In 1868 she published in French a volume relating to Byron, which was translated into English under the title "My Recollections of Lord Byron." Byron remained for six months among the Grecian islands, and then sailed for Missolonghi, where he arrived Jan. 5, 1824. On the 22d he wrote the lines "On Completing my Thirty-sixth Year," his latest poem. On the 30th he was appointed commander of an expedition against Lepanto, which never sailed. On Feb. 15 he was seized with a convulsive fit, from which he partially recovered, but relapsed, and gradually failed till April 9, after which he never crossed his threshold. He died on the 19th, vainly endeavoring with his last breath to make his servant understand some message, of which the only intelligible words were the names of a few friends, his sister, wife, and daughter. His body was embalmed and sent to England; the dean of Westminster refused permission for its interment in Westminster abbey, and it was buried in the family vault in the little church of Hucknall, near Newstead Abbey. By his will, executed a few months after his marriage,

he bequeathed his whole property to his sister, Mrs. Leigh. The will was duly proved after his death, but it does not appear that she ever came into possession of the estates, for in her later years she received a royal pension. Byron's title devolved upon his cousin, George Anson Byron (born March 8, 1789, died March 1, 1868), who was an admiral in the British navy, and became lord in waiting to the queen. He was succeeded by his son, George Anson Byron (born June 30, 1818, died Nov. 20, 1870), who was succeeded by his nephew, George Frederick William Byron (born Dec. 27, 1855), the 9th and present Lord Byron of Rochdale.—Besides the longer works above enumerated, Byron's smaller poems number about 200; among which are the "Hebrew Melodies," "Epistle to Augusta," "The Dream," "Darkness," "Churchill's Grave," and "Stanzas to the Po." His letters, which are given in full or in part in Moore's "Life," number more than 1,000. Byron as a poet was overestimated during his lifetime and unduly depreciated after his death. While he lived, his rank, his personal beauty, his domestic misfortunes, and a certain air of romantic mystery with which he knew how to invest his character, actions, and writings, made an impression on the public, and especially on women and young men, which has never been exceeded in intensity in the history of literature. For a time his sentimental melancholy, his cynicism, and his skepticism infected not only English literature, but even English society, and Byronism became the rage through a large and fashionable circle. After his death a natural reaction took place, and Byron's reputation as a poet sank far below its just value. More recently the tendency of criticism seems to be toward the opinion that, in spite of the morbidness and shallowness of much of his thought, he was one of the great masters of the English language, and that his place is among the highest of English poets. On the continent of Europe, especially in France, Germany, Italy, and among the Slavic races, his poetry has always maintained its influence, undoubtedly in some degree because of its political bearing, and its fervent advocacy of liberal and democratic ideas.—The works relating to Byron are numerous. Most of them, as those of Dallas, Medwin, Lady Blessington, Leigh Hunt, Kennedy, and the countess Guiccioli, are of little value. Moore's "Letters and Journals of Lord Byron, with Notices of his Life" (London, 1830), is the standard work. Of later works the two most important are in German: Eberty, *Lord Byron, eine Biographie* (2 vols., Leipzig, 1862), and Elze, *Lord Byron* (2 vols., Leipzig, 1870; translated into English, "Lord Byron, a Biography, with a Critical Essay on his Place in Literature," London, 1872). II. *Anne Isabella Milbanke*, wife of the preceding, born May 17, 1792, died May 16, 1860. She was the only child of Sir Ralph Milbanke and his wife Judith Noel, the sister of

Thomas Noel, Viscount Wentworth, of whose large estates she ultimately became heir. She was married to Lord Byron Jan. 2, 1815, and separated from him in February, 1816. Upon the death of her uncle without issue, in 1815, the title of Viscount Wentworth became extinct, but the mother of Lady Byron became Baroness Wentworth; and upon her death in 1822 this title remained in abeyance between Lady Byron and her cousin the earl of Scarsdale, upon whose death in 1856 Lady Byron became Baroness Wentworth. For nearly 30 years she devoted her large income to benevolent purposes, especially for industrial schools and reformatory institutions. III. *Ada Augusta*, daughter of the preceding, born in London Dec. 10, 1815, died Nov. 27, 1852. In 1835 she married William, Lord King, afterward earl of Lovelace. Her eldest son, Byron Noel Baron Wentworth, usually known by the courtesy title of Viscount Ockham, born May 12, 1836, died Sept. 1, 1862. He put aside the claims of his rank, engaged as a common workman in a ship yard, and insisted upon being called simply Ockham. He never married, and upon his death was succeeded by his brother, Ralph Gordon Noel, born July 2, 1839, who in 1861 took by royal license the surname of Milbanke, in place of that of King. He is the present Baron Wentworth.

BYRON, Henry James, an English playwright, born in Manchester in the earlier part of the century. He is the son of Mr. Henry Byron, who was in the British consular service, and he completed his education in London. He early wrote for periodicals, was the original editor of the comic paper "Fun," and published a novel, "Paid in Full." He produced in 1858 at the Strand theatre, London, his first burlesque extravaganza, "Fra Diavolo," which was followed by "Babes in the Wood," "Jack the Giant Killer," "Dundreary Married and Done For," and many other popular farces and pantomimes. He made his first appearance as an actor in the Globe theatre, London, in October, 1869, in his own drama "Not so much a Fool as he Looks." Among his remaining plays are "War to the Knife," "A Hundred Thousand Pounds," "Good News" (1872), and "Old Soldiers" (1873).

BYRON, John, an English admiral, born Nov. 8, 1723, died April 10, 1786. He was a midshipman on board the *Wager*, one of Lord Anson's circumnavigating squadron, was cast away on a desolate island off the coast of Patagonia, where he remained five years, suffering great hardships, returned to England in 1748, and rose to high rank in his profession. In 1758 he commanded three ships of the line, and distinguished himself in the war with France. In 1764 he was placed in command of an exploring voyage between the Cape of Good Hope and South America, in the course of which he discovered two islands, one of which still bears his name. In 1768 he published a narrative of his sufferings and priva-

tions when cast away in 1740-'46, a work which was very popular. In 1769 he was appointed governor of Newfoundland; in 1778 he watched the movements of a fleet sent by the French to aid the American revolutionists, and in 1779 fought an indecisive action off Grenada with the French squadron commanded by Count d'Estaing.—His eldest son, John, was the father of Lord Byron, the poet. His second son, George Anson, was a captain in the navy; and his son John, also a naval officer, succeeded the poet as Baron Byron, and was the author of "A Narrative of the Voyage of his Majesty's Ship Blonde to the Sandwich Islands" (4to, London, 1825).

BYSSUS. I. The name given to the long, delicate, shining fibres by which some of the bivalve shells attach themselves to submarine bodies. It is sometimes coarse and strong, as in the common mussel (*mytilus edulis*), or silky, as in the great *pinna* of the Mediterranean. According to De Blainville, it is not a secretion spun from a glandular organ, but a bundle of muscular fibres, which, though dried and apparently lifeless externally, are actively contractile at their origin near the foot; there seems to be a regular gradation from the ordinary foot to a true byssus. Along the Mediterranean the silky byssus of the *pinna* is woven into various articles, such as gloves and stockings, more curious than useful. II. The byssus of the ancients (Gr. *βύσσος*; Heb. *bute*) has been the subject of many learned disquisitions, some critical authorities contending that it was cotton, and others that it was linen. It is not unlikely that the word was applied, in various connections and at various times, to both cotton and linen textiles. The mummy cloth of the Egyptians, which Herodotus designates as byssus, has been proved by microscopic examinations to have been linen.

BYSTRÖM, Johan Nik, a Swedish sculptor, born at Philipstad, in Wermland, Dec. 18, 1783, died in Rome, March 13, 1848. He was at first engaged in business, but subsequently studied under Sergell at Stockholm, and in 1809 gained the first prize in the Swedish academy of arts. The following year he went to Rome, and produced there "A Drunken Bacchante," which was received with favor at home. From this time he lived partly in Rome and partly in Sweden. In 1815 he exhibited in Stockholm a colossal statue of the crown prince, who commissioned him to execute statues of several of the Swedish kings. His principal works are a "Nymph going into the Bath," "Juno suckling the young Hercules," "Pandora combing her Hair," "A Dancing Girl," a statue of Linnæus, and colossal statues of Charles XIII., Charles XIV., and Gustavus Adolphus.

BYTOWN. See OTTAWA.

BYZANTINE EMPIRE, called also the Roman empire of the East, the Eastern empire, the Greek empire, and the Lower empire. On the death of Theodosius the Great, A. D. 395, the

division of the great Roman empire into East and West became permanent. The eastern portion, with Constantinople, the ancient Byzantium, for its capital, was bequeathed to the elder son Arcadius, with whom the line of Byzantine emperors properly commences. The Byzantine empire, beginning in 395, ended in 1453, with the Mohammedan conquest of Constantinople. At its inception it consisted of two prefectures, namely: 1, the Orient, including five dioceses, Oriens (proper), Egypt, Asia, Pontus, and Thrace, and embracing all the Asiatic regions to the Euphrates and independent Armenia, and Egypt and the African coast west of it to the Greater Syrtis; 2, Illyricum, with the two dioceses of Macedonia and Dacia, embracing Upper and Lower Mœsia, Eastern Illyria, the whole of ancient Macedonia, Hellas, Crete, and the islands of the Ægean, as well as possessions in the Tauric Chersonesus (Crimea). The line of demarcation between the empires of the East and the West, commencing a little above Pesh, followed the Danube, the Save, and the Drina, and was continued by a line drawn from the town of Scodra, now Scutari, near the Adriatic, toward the Greater Syrtis off the coast of Cyrenaica in Africa. Rufinus was guardian for the young Arcadius; after the overthrow of the former by Stilicho, the minister of the Western empire, the eunuch Eutropius, and later Gainas, the murderer of Rufinus, succeeded to the premiership. During this period the Goths ravaged Greece. After the death of Gainas in a civil war excited by his ambition, the empire was ruled by the immoral and avaricious wife of Arcadius, Eudoxia, till her death in 404. The young son of Arcadius, Theodosius II., succeeded to the throne in 408. Anthemius administered the government for him till 415, and then his sister, the princess Pulcheria, became regent. Pulcheria assumed the title of Augusta, governed the empire ably, and excluded her brother from any participation in its administration. Under her sway a successful war was carried on against the Persians, and the western empire was conquered by the Byzantines for Valentinian III., who ceded the province of Western Illyria, including Pannonia, Dalmatia, and Noricum, as a recompense therefor. On the other hand, Thrace and Macedonia were ravaged with impunity by Attila and his Huns, and Pulcheria was obliged to purchase peace by the payment of an annual tribute to the barbarians. The *Codex Theodosianus* was drawn up in this reign. After the death of her brother, Pulcheria was called to the throne, 450. She was the first female who ever attained to this dignity. She gave her hand to the aged senator Marcian, whose prudence and valor averted the attacks of the Huns from his empire. Shelter was given in this reign to the Germans and Sarmatians, who fled before the Huns. Marcian persuaded Attila to wreak his thirst for bloodshed and destruction upon Italy and the West, instead of the

East; yet the yearly tribute was raised by Attila from 700 pounds of gold to 2,100, and a district to the southward of the Danube was ceded to him. Pulcheria died in 453, and Marcian reigned four years after her death. Leo I., a Thracian of obscure origin, was appointed emperor (457-474). His expedition against the Vandals was unsuccessful. His coronation by the patriarch of Constantinople is said to be the earliest example of a coronation by the Christian clergy. Leo helped the Romans against the Vandals, and enjoyed great popularity and influence at Rome, which extended even to nominating their rulers. His grandchild, Leo II., aged three years, was his successor, but died shortly afterward. Zeno the Isaurian (474-491) succeeded him. Basiliscus drove him away from his capital shortly after his accession and made himself emperor. At this period a fire took place which consumed the library of Constantinople, containing 120,000 manuscripts, the treasures of classical literature. By the help of his fellow provincials, Zeno soon regained the throne. In his reign serious and bloody disputes arose about the nature of Christ between the Monophysites and the orthodox. Zeno sided temperately with the latter, and issued the *Henoticon* (482), which restored outward harmony to the church. He protected his empire against Theodoric and his Goths by presents and by persuading them to march upon Italy. At his death his widow Ariadne married and raised to the throne the minister Anastasius (491-518). A new enemy appeared in the Bulgarians, against whom he protected the peninsula in which Constantinople lies by building across it the celebrated "long walls." His favorable disposition toward the Monophysites caused formidable insurrections against his rule. After his death Justin I., a Thracian and commander of the body guard, was nominated emperor by the soldiers (518-527). He adopted his nephew Justinian as his heir. He persecuted the Monophysites, and received the powerful support of the orthodox clergy. Justinian I. succeeded him (527-565). Under him the Byzantine empire attained the summit of its glory. His general Belisarius overthrew the empire of the Vandals and acquired the whole of northern Africa, repelled the Persians at the Euphrates, conquered Sardinia, Corsica, and the Balearic isles, and defended Constantinople against the Bulgarians. Narses followed up the victories of Belisarius, destroyed the Ostrogothic power in Italy in 555, and restored Italy and Sicily to the sceptre of Byzantium. Italy was governed by a Greek exarch, whose residence was Ravenna, the last capital of the former emperors of the West. Industry flourished, the silk culture was introduced into Europe, civilization advanced, and intellect developed itself, in the long reign of Justinian. The code of civil law then drawn up has been ever since a leading authority among the jurists of all civilized nations. The

race-course factions of blues, greens, reds, and whites now acquired a dangerous license. As the emperor sided with the blues, the greens rose in tumult, and were only put down after committing fearful ravages in the capital. The Monophysite quarrel also agitated the empire. The consular government of the capital was abolished, and the last schools of the pagan philosophers in Athens were shut up by imperial command. Justinian's successor was the unfortunate Justinus II. (565-578). The Lombards wrested from the Byzantines a large part of Italy (568); Justinus was unsuccessful against the Persians, and the Avars plundered the provinces on the Danube. The Byzantine government in this reign allied itself for the first time with the Turks beyond the Caspian sea against their common enemy, the Persians, and received an ambassador from their khan. Tiberius II. (578-582) purchased peace from the Avars, and was fortunate against Chosroes I., king of the Persians. His general, Maurice, who gained his victories for him, was appointed his successor, or the Caesar, and reigned from 582 to 602. Maurice reinstated Chosroes II., who had been driven away by his subjects, upon the throne of Persia, and made an advantageous peace with him. His army mutinied as he was marching against the Avars, who had increased the tribute payable to them by treaty. The soldiery elected Phocas as his successor (602-610), and the "green" faction of the metropolis rose and murdered Maurice and his sons. The people, growing weary of the tyrannical rule of Phocas, called to their aid the governor of the imperial prefecture of Africa. The governor sent his son, Heraclius, who took Constantinople. Phocas was torn in pieces by the multitude, and Heraclius made emperor (610-641). The Persians conquered from him Syria, Palestine, and Asia Minor, and pressed him so hard that he thought of leaving Constantinople for ever, and making Carthage his capital. From this step he was dissuaded by the patriarch, and between 622 and 627 he recovered all the booty, including the holy cross, which Siroes, the monarch of Persia, had taken from Jerusalem. In 626 the Avars made an unsuccessful attack upon Constantinople. From this time forth we hear nothing more of the wars between the Byzantine empire and the Persian monarchy. The Arabs, under Mohammed and his successors, now appear as the most formidable foe of the Greeks. They conquered the country bordering on the Euphrates, Syria, Judea, and all the Byzantine possessions in Africa, 635-641. The Byzantines were weakened by their intestine religious controversy about Monothelism, or the one will of Christ. On the Danube a number of Slavic kingdoms arose, which soon threw off all dependence upon the empire. Constantine III., son of the preceding, died in 641; his stepbrother, Heraclonas, lost the throne by an insurrection, and was banished. Constans II. became emperor (641-

668). In his reign the empire lost Cyprus and Rhodes to the Saracens, and suffered defeat at the hands of the Lombards in southern Italy. Constans became the victim of a conspiracy at Syracuse, in Sicily, while endeavoring to protect the coasts and islands of the Mediterranean from the Saracens. He published the *Typos*, an edict intended to quiet the controversy between the orthodox and the Monothelites. Pope Martin I. condemned the edict, and was thrown into prison by the eastern emperor. He was succeeded by his son Constantine IV., Pogonatus (668-685). The Moslems now repeatedly besieged Constantinople by sea, but were forced to retire by the terrible Greek fire. On the other hand, the government was compelled to pay tribute to the Bulgarians, who had conquered and founded a kingdom in ancient Moesia. Justinian II., Rhinotmetus, or Shorn Nose, succeeded his father (685-711). His tyranny caused an insurrection which cost him his nose and ears and an exile to the Crimea. During his exile Leontius and Tiberius III., two generals, reigned successively. Justinian returned and was assassinated. With him the race of Heraclius became extinct. Philippicus Bardanes, his general, succeeded him. Next came Anastasius II., whose troops mutinied as he was leading them against the Saracens. He resigned his authority and took refuge in a cloister, and was succeeded by Theodosius III. Leo III., the Isaurian, reigned from 718 to 741. He beat back the Arabs from Constantinople, but not till after they had ravaged Thrace. The image controversy now became violent. Leo sided with the innovators, and ordered the removal and afterward the destruction of all images in the churches. This iconoclasm roused the island population of the Cyclades to revolt, but Leo repressed the sedition. This position of Leo weakened the Byzantine power in Italy, and the year 728 saw the last of the exarchate of Ravenna. His son Constantine V. succeeded him (741-775). He was as much of an iconoclast as his father, and a more fortunate general. The dislike between him and the monks was mutual. He shut up many of the monasteries and convents, because he alleged that the inmates were sluggards and corrupted the people. He reconquered from the Arabs a part of Syria and Armenia, and destroyed their fleet off Cyprus. In 759 he drove out of the Peloponnesus 200,000 Slavs, and ended his successful career by victories over the Bulgarians. Leo IV., the Khazar, his son, succeeded him (775-780). The boundaries of the empire were well maintained against numerous foes. Constantine VI. succeeded under the guardianship of his mother Irene. She was an image-worshipper, and assembled the second council of Nice, whereat the iconoclasts were condemned by 370 bishops. Eventually she put out her son's eyes (797), and occupied the imperial throne in his stead. She now desired to marry the new emperor of the West, Charlemagne; but this

idea of reuniting the Eastern and Western empires was so repugnant to popular opinion, that an insurrection took place which ended in her dethronement (802). Nicephorus, the high treasurer, was proclaimed emperor. He made a treaty with Charlemagne, which constituted the free territory of Venice as the limit of the two empires, became tributary to Haroun al-Rashid, and fell in an engagement against the Bulgarians (811). To him succeeded Stauracius and Michael I., who fought unhappily against the Bulgarians. Leo V., the Armenian, a reputable general, succeeded (818). Krumn, khan of the Bulgarians, devastated Thrace, took Adrianople, and laid siege to Constantinople, when a sudden death surprised him. Leo then drove the barbarians back and forced them to a 30 years' truce. He ruled ably, but his dislike to the use of images raised up enemies and cost him his life (820). Michael II., the Stammerer, reigned from 820 to 829. About 824 the Saracens of Spain wrested from the empire the island of Crete, and in 827 the Aglabite Saracens seized Sicily. The same reign witnessed the loss of Dalmatia to the Bulgarians. The public-spirited Theophilus, son of the preceding (829-842), fought long and bravely against the Arabs, but on the whole fruitlessly. After some reverses he died of grief, leaving Constantinople much strengthened and embellished. He favored the iconoclasts. His son, Michael III., succeeded (842-867), at first under the guardianship of his mother Theodora, who put an end for ever to the iconoclast controversy by the restoration of images, which was ratified by the council of Constantinople (842). In his reign the Russians first appear as enemies of the empire, and the patriarch Photius quarrelled with the pope, Nicholas I., and laid the foundation for the separation of the eastern and western churches. The Paulician schismatics were persecuted. After Michael came Basil I., the Macedonian (867-886), founder of the Macedonian dynasty, which lasted till 1057. In 877 he published a compilation of laws, completed by his son, which, under the name of *Basilica*, formed the code of the empire. In foreign relations, he beat the Saracens in the East and crossed the Euphrates triumphantly, protected Dalmatia and Ragusa from the Aglabites, and reestablished the Byzantine power in Apulia and Calabria, which the Saracens had occupied. On the other hand, the Saracens completed the conquest of Sicily by the capture of Syracuse, and ravaged the Peloponnesus. His son Leo VI., the Philosopher (886-911), was an author and a patron of the arts and sciences; but his reign was disastrous in a military point of view. He called in the aid of the Turks against the Saracens; this showed the former the way into the Byzantine empire, and they captured the island of Samos for themselves. In the same way Leo called in the aid of the Hungarians against the Bulgarians. The Russians appeared before

Constantinople with a large fleet, but effected nothing. The Lombard dukes took from the Byzantines the greater part of what remained to them in Italy. The Arabs took Thessalonica, but were driven back by Ducas; Leo then sent an army into Asia, which penetrated into Mesopotamia, and achieved an advantageous peace. After Leo reigned his son Constantine VII., Porphyrogenitus (911-959), at first jointly with his brother Alexander, who soon died. His mother Zoe then administered affairs, and protected the empire from the Bulgarians for seven years. Romanus Lecapenus (919) then obtained a share in the government, and subsequently associated with himself his three sons, Christopher, Stephen, and Constantine VIII. They fought against the Bulgarians, Hungarians, and Russians. In 945 they were obliged to retire and give place to the empress Helen, who governed while her husband Constantine VII. studied. At this period Russian and Hungarian princes came to Constantinople, were baptized, took Byzantine women in marriage, and spread Christianity in their native lands. Constantine's son Romanus II. succeeded (959-968). Crete was recaptured from the Saracens by Nicephorus Phocas, the emir of Aleppo was forced to pay tribute, and the Russians were driven back. Nicephorus II., Phocas, succeeded (968-969), after marrying Theophano, the widow of Romanus. He was defeated in Sicily, but recaptured from the Saracens Syria and Cilicia, and the island of Cyprus. His wife had him murdered, and gave her hand to his successor, the victorious general John Zimisces (969-976). He fought victoriously against the Arabs in Asia Minor, and against the Russians and Bulgarians in Europe. He extinguished for a time the political independence of the latter. His successor, Basil II., son of Romanus (976-1025), was for a long time occupied in combating two rebellious generals, Bardas Phocas and Bardas Sclerus. In 1018 the Bulgarian kingdom was annihilated and Bulgaria became a Greek province, and remained so till 1186. It was he who put out the eyes of 15,000 Bulgarian prisoners and sent them back to their king, who fell down senseless at the spectacle, and soon afterward died. Constantine IX., his brother, reigned from 1025 to 1028. Then followed in succession Romanus III. (1028-'34) and Michael IV. (1034-'41), both husbands of Zoe, the daughter of Constantine IX. Michael V. succeeded, and was driven out by the people because he would not marry Zoe. In 1042 Zoe and her sister Theodora were joint empresses, until Zoe married Constantine X. (1042-'54). During this period the Russians, Petchenegs, and Arabs ravaged the empire. The Seljuk Turks appeared as formidable enemies, and the Norman adventurers wrested from the Byzantines all their remaining possessions in lower Italy, except the city and territory of Otranto. After Constantine, Theodora again became empress (1054-'56.) In 1054 occurred the total separa-

tion of the Greek from the Latin church. With Michael VI., Stratioticus, the Macedonian dynasty became extinct (1057). Isaac Comnenus, the first of the Comneni, reigned from 1057 to 1059. To him succeeded Constantine XI., Ducas (1059-'67). The Seljuks invaded the empire on the east and south, and the Scythian Uzes on the north. The latter were defeated. Eudokia, widow of Constantine XI., married Romanus IV., Diogenes (1067-'71). He defeated the Seljuks under Alp Arslan in three campaigns in Cilicia and Cappadocia, but in the fourth was taken prisoner. During his absence Michael VII., with Andronicus I. and Constantine XII., his brothers, was proclaimed emperor (1071-'78). The Serbs and Seljuks invaded the empire, the latter conquering almost all Asia Minor. Michael resigned, and his successor Nicephorus III., Botaniates (1078-'81), had a stormy reign, troubled by numerous rival claimants to the imperial dignity. His general, Alexis Comnenus, dethroned him, and reigned from 1081 to 1118. His administration is remarkable for its relations to the western crusaders. Robert Guiscard, the Norman duke of Calabria, advancing the claims of his relative Michael VII., defeated Alexis in Epirus, who, however, gained brilliant victories over the Petchenegs and the Kumans. The encroachments of Mohammedan power, and the dangers that threatened all Christendom therefrom, now drew the attention of western Europe to this complication of affairs. The Turks had invaded Bithynia, and Alexis called the courts of the West to his aid. Pope Urban II. authorized the preaching of the first crusade. The first host of crusaders left an unfavorable impression upon the Byzantines. With the second a treaty was concluded; Alexis was to furnish a number of troops, and the crusaders were to hold the provinces reconquered from the Moslems as fiefs of the empire. Neither party kept faith. Bohemond, the son of Robert Guiscard, laid siege to Durazzo, but shortly afterward concluded a peace with the emperor. His son, John or Kalo-Joannes Comnenus, succeeded him (1118-'43). He fought victoriously against the Seljuks, reconquered many towns, defeated the Petchenegs and the Hungarians, and reconquered Lesser Armenia. He was succeeded by his son Manuel Comnenus (1143-'80), who was victorious over the sultan of Iconium, and over Raymond of Toulouse, the Christian prince of Antioch. In 1147 a new army of crusaders arrived at Constantinople, to the consternation of the inhabitants. Manuel conquered the island of Corfu from the king of Sicily, in retaliation for an invasion of Greece by the latter. Between 1180 and 1183 reigned Alexis Comnenus II., son of the preceding. Andronicus, the last of the Comneni, occupied the throne two years, and was succeeded by Isaac II., Angelus (1185-'95). In his reign the king of Sicily undertook the conquest of the Byzantine empire, but was eventually beaten back. The Bulgarians recovered their inde-

pendence in 1186. He was dethroned by Alexis III. (1195-1203). Isaac's son, Alexis the Young, supplicated the aid of the crusaders, then assembled at Venice, and obtained it in return for a promise to pay 200,000 marks of silver. The crusaders captured Constantinople, July 18, 1203, and restored Isaac, who with his son was put to death the next year. Nicholas Canabus succeeded, and was in turn deposed by Alexis Duca (Murzuffe), the leader of the revolt against Isaac. The crusaders again captured the city in April, 1204. The Latin empire of Romania was established (1204-'61), and Count Baldwin of Flanders elected first emperor. The European possessions of the empire were divided into four parts: 1. The imperial domain, including one fourth part of the city of Constantinople, the other three parts being divided between the French and Venetians, Thrace, some castles on the Asiatic coast, the islands at the mouth of the Hellespont, and the suzerainty over the feudal dependencies of the empire. 2. The kingdom of Thessalonica was carved out for Boniface, marquis of Montferrat, and included Macedonia and a part of Greece. 3. The republic of Venice obtained the coast lands of the Adriatic and the Ægean, a portion of the Morea, many of the Cyclades and Sporades, the islands of Crete and Negropont, and the territory of Gallipoli on the Thracian Chersonese. 4. Many other fiefs were given to French knights, of which the principal were the duchy of Athens and Boeotia, and the principality of Achaia and the Morea. The Greek empire still survived in Asia Minor. Theodore Lascaris, who had been elected emperor by the senate in Constantinople, established his capital at Nicæa, whence the Greek empire of Nicæa received its name; it consisted of Bithynia, Mysia, Ionia, and part of Lydia. On the S. E. shores of the Black sea, from Sinope to the river Phasis, the Comnenian empire of Trebizond arose. The Comnenian princes, Alexis and David, declared their independence at the fall of the old Byzantine empire, and one of their successors assumed the imperial title. In Epirus, Ætolia, and Thessaly, Michael Angelus established a Greek principality. Returning to the history of the principal fragments of the Byzantine empire, we find that the Greeks called in the aid of John, king of the Bulgarians, who defeated Baldwin and took him prisoner. Henry, brother of Baldwin, succeeded him (1206-'16). He fought with success against Lascaris, emperor of Nicæa, and brought the king of the Bulgarians to terms. He gave honors and offices of trust to the Byzantines, and protected them against the oppressions of the Latin clergy. Peter de Courtenay succeeded him (1216). He was soon afterward captured by Theodore, independent prince of Epirus, in a vain attempt to take Durazzo for the Venetians. His younger son, Robert, succeeded him after an interregnum (1221-'28). During his reign John III., the Greek emperor of Nicæa, and Theodore, the prince of Epirus, re-

duced the territory of the Latin emperors of Romania almost to the peninsula on which Constantinople stands. Jean de Brienne, titular king of Jerusalem, next took the reins of power as regent for Baldwin II. (1228-'37). The Bulgarians made an alliance with the emperor of Nicæa and threatened the existence of the Latin empire. Jean de Brienne saved Constantinople, and the allies turned their arms against each other. Baldwin II. then reigned unaided (1237-'61). He implored men, arms, and money of the potentates and nations of the West, but they made no adequate response to his entreaties. The consequence was that Michael Palæologus, emperor of Nicæa, with the help of the Genoese navy, which was driven to the Greek alliance by hatred of Venice, obtained possession of Constantinople, July 25, 1261. The Genoese were rewarded by liberal mercantile privileges. The Latin empire of Romania now vanished, although many of the Latin principalities, such as the duchy of Athens, survived until the final downfall of the restored Byzantine empire in the 15th century. With Michael Palæologus (1261-'82) commenced the dynasty of the Palæologi, which endured until the Turkish conquest. By his endeavors to reunite the Greek and Latin churches he gained the hatred of his clergy and people. Andronicus II., his son, succeeded (1282-1288), and immediately restored the Greek ritual. To defend his empire against the Turks, he took into pay a body of Catalan troops (1303); the Catalans beat back the enemy, and then began to pillage Greece and settle down upon estates got and held by the right of the sword. He abdicated in favor of his grandson, Andronicus III. (1328-'41). The Turks took Nicæa and Nicomedia in 1339, and plundered the coasts of Europe. Andronicus unsuccessfully opposed them, and made a barren alliance against them with the pope, the king of France, and other western powers. His son John V. or VI. succeeded him (1341-'91). It cost him a civil war of ten years to rid himself of his guardian, Joannes Cantacuzenus. During this war the Turks first acquired territory in Europe. Gallipoli was seized by them in 1357; in 1361 Sultan Amurath took Adrianople, and made it his residence. John appealed to the pope to aid him in his extremity, offering to reunite the eastern with the western church, but to no purpose. Subsequently Amurath conquered Macedonia and part of Albania, when John signed a treaty acknowledging himself the vassal of the sultan, and covenanting to pay tribute. Philadelphia, the last possession of the Byzantines in Asia, capitulated to Bajazet, successor of Amurath. When the sultan ordered that the emperor's son should accompany him in his wars, John Palæologus died of a broken heart. Manuel, son of the preceding, escaped from the court of Sultan Bajazet, where he was a hostage, at the news of his father's death, and was proclaimed emperor (1391-

1425). Bajazet laid siege to Constantinople, but raised it to levy war upon the Hungarians. He returned in 1397, but made peace through fear of another western crusade. In 1400 he made a third attempt upon the metropolis; but the invasion of Tamerlane, which threatened the existence of the Turkish empire, recalled Bajazet into Asia, and saved the Byzantine empire for a time. Manuel recovered some lost ground while the sons of Bajazet were quarrelling. Yet in 1422 Sultan Amurath II. appeared before the walls of Constantinople, and employed cannon, for the first time in eastern wars. Another fraternal quarrel on the part of the Turks brought about the return of peace. During this reign a Turkish *cadi* was established and a royal mosque erected in Constantinople. John VI. or VII., son of Manuel, succeeded (1425-'48). Seeing that he was unable to defend his empire from the Turks, he endeavored to effect a reconciliation between the eastern and western churches, on the condition of a new western crusade in his favor. For this purpose he went to the council of Ferrara and Florence, which was presided over by Pope Eugenius IV. The reunion was proclaimed at Florence, but it did not take effect in the East. In 1444 Amurath reduced the Byzantine empire to the city and suburbs of Constantinople, and out of generosity allowed the emperor to end his days in peace, on condition of paying tribute. His brother, Constantine XIII. (1448-'53), was the last of the Byzantine emperors. He made a last appeal to the princes of the West, and to the prince of Georgia, whose daughter he had married. Giovanni Giustiniani, a Genoese nobleman, with 2,000 Genoese and Venetian auxiliaries, and four Genoese ships of war, were the sole results of Constantine's appeal. The total garrison did not exceed 8,000 soldiers. The Turks appeared before the walls of Constantinople April 6, 1453, with an army of 400,000. They were not able to break the chain which protected the entrance of the harbor, but Sultan Mohammed II. had his fleet carried on rollers 10 miles overland, and launched into the inner gulf. Both sides fought bravely, but after a siege of 53 days Constantinople fell, May 29, 1453. Constantine died heroically in the breach. The city was delivered over to rapine, and the mass of the inhabitants sold into slavery. The brothers of Constantine, Demetrius and Thomas, held out for a short season in the Morea. This with the rest of the Latin principalities, which had acknowledged a loose feudal subjection to the Byzantine emperor, had fallen by 1460. David, the last of the Comneni and the last emperor of Trebizond, submitted in 1461. Thus perished an empire which had kept the light of letters and civilization burning through all the night of the dark ages, when western Europe, including even Italy, lay prostrate at the feet of barbarian conquerors, with whom the will of the strongest was the sole law.—

The Byzantine empire was divided for administrative purposes into prefectures, dioceses, and themes or provinces. The power of the emperor was absolute. He claimed to inherit the rights of the Roman emperors, and to be the lawful ruler of the West. He was anointed and crowned by the patriarchs of Constantinople. As has been seen, the influence of women, favorites, and the clergy was great. The ceremonial of the Byzantine court was carefully elaborated and rigidly maintained. The consulate became extinct in the 6th century, and the senate and the last forms of municipal self-government in the 10th. The emperor was advised by a council of state, in which none found admittance except at his pleasure. The functionaries of government were divided into many classes, and each class had distinctive privileges. Eunuchs enjoyed high rank, and to them was intrusted the immediate attendance upon the holy person of the emperor. The *major domus* of the East was called first *curopalates*, and afterward *protospatharius*. The body guard of the emperors began in the 10th century to be composed of Germans and Northmen. The commandant of the fleet was the *megas dux*.—The original sources of Byzantine history are the Byzantine historians themselves, who wrote in corrupt Greek. Only a few of these have been translated into any of the modern languages. Of the authorities in the modern tongue, we cite Le Beau, *Histoire du Bas Empire*; Zinkeisen, *Geschichte Griechenlands*; Fallmerayer, *Geschichte des Kaiserthums Trapezunt*; Gibbon's "Decline and Fall of the Roman Empire;" Finlay's "History of the Byzantine and Greek Empires" (London, 1854); and for the Latin settlement in the East, Buchon's *Histoire des conquêtes et de l'établissement des Français dans les États de l'ancienne Grèce* (Paris, 1846). Du Cange's work in Latin, *Historia Byzantina* (Paris, 1680), was before Gibbon the only authority generally consulted. An interesting work on the Byzantine empire is Murai's *Essai de chronographie Byzantine* (St. Petersburg, 1855).

BYZANTINE HISTORIANS, a series of little read but important lower Greek authors, who wrote between the 4th and 15th centuries chiefly on the history of the Byzantine empire. Among the most noteworthy of them are Zosimus, Procopius, Agathias, Constantine Porphyrogenitus, Cedrenus, Anna Comnena, and Zonaras. Of these, Procopius is the best known, and is the only one who has been translated into English. Anna Comnena, daughter of the emperor Alexis I., who wrote a history of her father's reign, is also well known. A collection of the most important of them was made and published at the expense of Louis XIV. (*Corpus Scriptorum Historie Byzantinae*, 36 vols., Paris, 1648-1711). The Greek text is accompanied with a Latin translation and notes. The editors of this work were the Jesuits Labbé and Maltrait, Pétau

and Poussines, the Dominicans Goar and Combes, Prof. Fabrotti, Du Cange, Allaoui, the librarian of the Vatican, Banduri, librarian at Florence, Boivin, the royal librarian at Paris, and Bouilliaud, a mathematician. Another edition, with additions, was published at Venice (28 vols., 1729-'88). Some, not included in either collection, have been published separately since. Niebuhr entertained a high opinion of the value of the Byzantine historians in a general history of mankind, and projected a new edition of them, which was commenced in 1828, under the title *Corpus Scriptorum Historiæ Byzantinæ, Editio emendatior et copiosior* (Bonn). Of this edition 48 volumes were published. Bekker, the two Dindorfs, Schopen, Meinecke, and Lachmann were the principal editors. The best key to the language of these writers is the "Greek Lexicon of the Roman and Byzantine Periods," by Prof. E. A. Sophocles of Harvard university (Boston, 1870).

BYZANTIUM, an ancient Greek city on the shores of the Bosphorus, on a part of the site of the modern Constantinople. It was originally settled by a band of Megarian colonists before the middle of the 7th century B. C., but it was destroyed by Otanes, the Persian satrap, in the time of Darius Hystaspis. After the defeat of the Persians at Plataea (479), Pausanias, the general of the confederate Greeks, recolonized it with a body of Dorians and Ionians. From this heterogeneous constitution endless disputes arose, and Spartan and Athenian parties always existed within the walls. The fine harbor and advantageous position soon made it of great commercial importance. It obtained possession of the corn traffic between the shores of the Euxine and Greece and Egypt, and its fisheries were abundant. The wealth of its commerce procured for the harbor of Byzantium the name of the Golden Horn. It remained under the regency of the Lacedæmonians until Cimon captured it for the Athenians; but it soon returned to its original allegiance. Alcibiades got possession of it by the aid of the Athenian party within the city, in 408; but it was retaken by Lysander the Lacedæmonian in 405. Xenophon, with the remnant of his 10,000 men, passed through it on his way homeward. In 390 Thrasylbulus expelled the pro-Lacedæmonian oligarchy, and established the power of the democracy. Byzantium put itself at the head of a league consisting of Rhodes, Chios, Cos, and Caria, threw off the Athenian supremacy, and remained for a space entirely independent. As the commercial importance of Athens declined, that of Byzantium was augmented. When, however, Philip of Macedon besieged it, it returned to its Athenian allegiance, and called upon Athens for succor. Owing to the anti-Macedonian eloquence of Demosthenes, the aid was granted, and Phocion compelled Philip to raise the siege. The Byzantines erected a

monument in honor of the event, and granted the rights of Byzantine citizenship to the Athenians. During the progress of this siege the city was saved from capture by surprise, through a flash of light which illumined the northern horizon and betrayed the proximity of the besiegers. A crescent was stamped on the Byzantine coins in honor of this miraculous event; and when the Turks took Constantinople in the 15th century, they adopted this municipal symbol as their own national device. In the reign of Alexander the Great Byzantium acknowledged the Macedonian supremacy. In the dissensions of Alexander's generals, Byzantium sided with Antigonus against Polysperchon, and with Lysimachus against Seleucus. It was at this period much exposed to the incursions of the Thracians, Scythians, and other barbarians, on the land side. The Gauls made it pay heavy tribute, which caused the citizens to retaliate upon the commerce of the world, by levying a toll upon all vessels passing through the Bosphorus. This tax brought them into a war with the island of Rhodes, 221 B. C. Attalus, king of Pergamus, sided with the Byzantines; Prusias, king of Bithynia, with the Rhodians. The latter were successful, and commerce remained unburdened. Ancient writers give a very bad character to the Byzantines. Their morals were not above the standard of other large seaport towns. They preferred the sound of a flute to that of a war trumpet; and when Philip of Macedon was besieging the place, the Byzantine general, Leo, found that the only means of maintaining the courage of the Byzantines, and holding them to their duty, was to plant a range of cook shops along the ramparts. Byzantium was fortunate in allying itself with Rome from the first against the Macedonian kings, Antiochus of Syria and Mithridates of Pontus. In acknowledgment of its fidelity, the Romans allowed it to remain a free confederate city. In consequence of some popular disturbances, however, the emperor Vespasian deprived the citizens of their civic liberties and sent them a governor. In the civil war between Pescennius Niger and Severus, Byzantium sided with the losing claimant. The emperor Severus besieged the town, which defended itself for three years, and then capitulated from famine. The chief citizens were put to death and the massive walls razed to the ground. Subsequently he repented of this severity, embellished the town, and gave it the name of Augusta Antonina, in honor of his son Antoninus. Caracalla restored some of its former civic privileges, but Gallienus gave it up to pillage, and massacred many of the citizens. The inhabitants repelled the invading Goths in the time of Claudius II. Byzantium was the last refuge of Licinius in his war with Constantine. After its surrender to Constantine, he resolved to build a new city on its site and make it the capital of the Roman empire.

Thus Byzantium was merged in Constantinople, A. D. 380. Dionysius and others give the old city a circumference of 40 stadia. (See CONSTANTINOPLE.)

BZOVIVS, Abraham (Pol. *Bzowski*), a Polish scholar, born at Proszowice in 1567, died in Rome, Jan. 31, 1637. He was a Dominican, one of the most voluminous writers of his age,

gained for himself a high reputation as professor of philosophy and theology at Milan and Bologna, and continued the ecclesiastical annals of Baronius, who had left them off at the year 1198, having completed only 12 volumes. Bzovius carried them to the year 1532, in 2 volumes, from the 13th to the 21st, published first in Cologne and afterward in Rome.

C

C THE third letter in the English alphabet, as it is in the Latin and in those of all the modern European languages. Its form is derived by Scaliger from the Greek *kappa* (Κ), by dropping the upright stem, and rounding the < into C. Suidas calls it the Roman *kappa*, and Montfaucon, in his *Palaeographia*, gives several forms of the K which approach nearly to C. Others derive it from the Hebrew *caph* (צ), which has nearly the same form, but is inverted, since the Hebrews and Latins read in opposite directions. Others, from its position in the alphabet, derive it from the Hebrew *gimel* (ג), and make its affinities with the Coptic *gamma*, the Ethiopic *gemel*, and the Russian *glagol*. In the early Latin language C held the place which is now occupied by G, as appears from the inscriptions on the Duilian column raised in the Roman forum about 200 B. C., in which we find *macistratus* for *magistratus*, *leciones* for *legiones*, *pucnando* for *pugnando*, and *exfociont* for *effugiunt*. Thus Ausonius says, *Gamma vice functa prius C*. The C also sometimes represented the Greek *kappa*, since in the same inscriptions *Cartaciniensis* occurs for *Karthaginiensis*; but this function was more frequently fulfilled by the letters *qu*; thus the Greek *kal, kapkaipa, kékoupos* became the Roman *que, querquerus, and querquedula*. The tendency of the western languages has been to soften the oriental articulation, and the *gamma* or C, after being softened by being brought forward in the mouth to the front palate, and becoming K phonetically, superseded the *qu* which had been common in old Latin words. The Latins made no further phonetic change of C, always during the most flourishing period of their literature pronouncing it like *kappa*. If they had given the sibilant sound of C in the enunciation of the word Cicero, the Greeks in adopting the word would have written it with a *sigma*. Modern languages, however, have carried the process on further. The English has softened the aspirated C (ch) in *church, chime, chivalry*, and the French still more in *chevalerie, chemin*; while the unaspirated C has become a pure sibilant, as in *cirole, cent, cycle*. Thus the English *teach* comes from the Latin *doceo*, and the English *pleass* and the French *plaisir* from the Latin *placeo*. Some words, however, have not followed this phonetic change

from the original pronunciation. Thus the modern Scottish *kirk* still embalms the sound of the old English *church*. *Kindle* and *candle* show that the pronunciation of *ciander* is perverted; and the patois of northwestern France still preserves the hard sound of C in *chemin*, and so links it to the English *come*. But though the Latins did not soften the C to a sibilant, they did worse. Having aspirated it into K, they next dropped it, preserving only the aspirate to mark the hiatus, as, *tracto, traho*; *kerdona, herdona*. This same process is noticeable in the cognate languages; thus: *collum* (Lat.), *Hals* (Ger.) *kilster* (Eng.). In French the phonetic softening of the C is traceable in the word *Karolus* till the 9th century, then *Carolus*, and afterward *Charles*; and the comparatively modern use of the cedilla records the further progress of the change. C is also interchanged with some other letters besides the Q and K with which it is cognate; as with P in *pepo, coquo*, cook; *columba, palumba*; while *prox(as)imus* has supplanted *prope*, but not *prope* and *propius*. The phenomenon of the disappearance of C occurs in *sacramentum* (Lat.), *serment* (Fr.); *lacrima* (Lat.), *larme* (Fr.); and in many other cases for purposes of euphony.—As a numeral, C signifies 100, CC 200, and so on to 400. Among the Latins it stood for Caesar, Caius, Cassius, *centum*, and *condemno*; and on account of the last use it is called *littera tristis* by Cicero. CC stood for *calumnias causa* or *concilium cepit*; *cons.* for *consules*; Cl. for Claudius; C. V. for *Centum Viri*; and C. R. for *Civis Romanus*. In Italian C stands for *canto*. In French, a single C stamped on money marks it as the issue of the mint of Caen, and CC as the issue of the mint of Besançon.—In music, C is the name of one of the notes of the scale. It is the tone with which the so-called natural scale begins, and was designated by Guido *ut*, a name subsequently changed to *do* by the Italians. C is considered the key note, and its pitch is regulated by tuning forks. It is also a character used for the signification of time.

CAABA, or Kaaba. See MECCA.

CABAL, a small body of men united for some party or sinister purpose. It doubtless came from the French *cabale*, which has the same meaning as the English word. Some authors

have erroneously stated that the word was formed about 1670, from the initials of the five ministers of Charles II., Olifford, Ashley, Buckingham, Arlington, and Lauderdale, called the cabal ministry; but it was in use in English long before their time. It was probably derived from the Hebrew Cabala, and like that word generally conveyed the idea of something secret and mysterious.

CABALA (properly *Kabbalah*, from *kabbel*, to receive), a Hebrew word signifying reception, used to designate certain religious teachings supposed to have been handed down from remote times. Jewish writers use the word to denote several classes of teachings, such as the belief of the patriarchs before the giving of the law, and the instruction orally transmitted by Moses, which were long afterward reduced to writing, forming the Mishnah. In later times the Cabala came to denote an elaborate system of theosophy, in which may be found some of the leading doctrines of Brahmanism, Buddhism, and the so-called Neo-Platonism of the Alexandrian church. Still later, the term was applied to a mode of interpreting the Old Testament, especially the books of Moses, whereby a meaning was evolved not contained in the words themselves.—Our knowledge of the theosophy of the Cabala rests mainly upon two books. The first is the *Sepher Yetzirah*, "Book of Creation," ascribed to Rabbi Akiba, who flourished about A. D. 120, but probably composed about six centuries later. This was first printed at Mantua in 1562; with a Latin translation, at Amsterdam in 1642; and with a German translation and commentary, at Frankfurt in 1829. The second work is the *Sepher haz-Zohar*, "Book of Light," ascribed to Rabbi Simeon ben Yohai, a contemporary of Rabbi Akiba, first printed at Cremona (folio, 1558), almost simultaneously at Mantua (8 vols., 1558-'60), and very frequently since. This work, which may be called the bible of the cabalists, is now generally considered the composition of Abraham ben Samuel Abulafia, a Spanish rabbi of the 13th century. The fundamental ideas of the theosophic cabalism developed in these books are: The Supreme Being, *En Soph*, "the illimitable," is apart from and above everything that we can conceive; and as we can conceive of thought and existence, he is above all thought and being. He is absolutely without body, parts, or passions. It is not proper to say that he acts, thinks, wills, or feels, or that he even exists in any sense conceivable by us; for, as we can conceive of existence, it is finite, and nothing finite can be predicated of the infinite. But as the creation exists, and as *En Soph* is all and in all, everything must exist and be ordered in and by him. So from *En Soph* emanated a *sephirah*, sphere or outer intelligence, from that another, from that still another, and so on down to the tenth. These *sephiroth* are the actual creators and orderers of all things. They are all one with each other and with *En Soph*, and yet are dif-

ferent from each other and from him, somewhat as the sparks and flame which emanate from a fire are one with and yet different from the fire itself. Of the *sephiroth* nine are grouped into three triads of trinities, each triad and each trinity having an appropriate name and function; the tenth *sephirah* being the *Shekinah*, or revealed deity of the Hebrews. The *sephiroth* are not only emanations mediate or immediate of *En Soph*, but he also dwells in all fulness in each one of them. Each one of the *sephiroth* also became incarnate in one of the patriarchs, the tenth having been incarnate in David. The Cabala also undertakes to explain the mystery of human existence. Birth is but a sleep and a forgetting. All human souls existed before their earthly life began; all must enter into human bodies, and there undergo trial, many of them over and over again, before they can be admitted into heaven. Few new souls in any generation enter the world, for most bodies are inhabited by souls which have failed of purification in former trials. It is this which makes the course of the world of so long continuance, for every created soul must, no matter through how many trans-migrations, finally be purified in the flesh. The last soul of all will be that of the Messiah, who will be born at the end of days. When he shall have accomplished his earthly probation, the *pleroma* of humanity of all ages will be complete, and all, cleansed and purified, will ascend into heaven. To this theosophy and anthropology the Cabala adds rules and regulations for the conduct of individual life, based upon the mysteries of the Hebrew ritual.—The modes by which the Cabala educes the secret meaning veiled under the words of the Hebrew Scriptures are manifold, extending to every peculiarity of the text. Even in what we should regard as critical marks or as errors or fancies of some transcriber, as when a letter is written too large or too small, is inverted, or in any way distinguished, an occult intent was presumed. But the most notable system was that to which the cabalists gave the name of *gematria*, apparently a Hebrew way of writing the Greek *γνῶσις*, by which they designate the art of discovering the hidden meaning of words by means of their numerical value. Each Hebrew letter, besides its alphabetical character, is a numeral. *Aleph*, the first letter of the Hebrew alphabet, stands for 1, or with a line over it for 1,000. In the first and last verses of the Bible *aleph* occurs six times, thereby showing, according to the cabalists, that the duration of the world is to be 6,000 years. This principle came to be developed so that any word might be explained by any other word or phrase the letters of which contain the same numerical value. Thus the numerical value of *bereshith*, "in the beginning," the first word of Genesis, is 913; there is also the numerical value of the phrase *battorah yatear*, "by the law he formed," that is, the world; which shows that the law existed before creation, and the latter was accom-

plished through the former. The next word, *bara*, "he created," has the numerical value of 208; add this to the first word, and the sum is 1,116, which is also the numerical value of the phrase, *berosh hashshannah nibra*, "in the beginning of the year it was created;" showing that the creation of the world took place in the beginning of the Hebrew year. Another cabalistic formula was called *notarion*, "extraction," from the Latin *notare*. It consisted in taking some leading word of the Scriptures, and making each successive letter the initial of a new word, all of which, in order, should form an intelligible sentence.—The literature of the Cabala is considerable. Among the earliest commentators of the *Sepher Yetsirah* is the philosopher Saadiah Gaon, who flourished in Babylonia in the 10th century, and was followed by many other distinguished writers in Asia, Africa, and Spain. In later times Provence, Germany, Italy, Turkey, and Poland became successively the seats of cabalistic lore. (See HEBREWS.)

CABANEL, Alexandre, a French painter, born in Montpellier, Sept. 28, 1828. He studied in Paris under Picot, obtained prizes in 1844 and 1845 for his earliest productions, and has increased his reputation by many pictures on religious and mythological subjects. Among the latter are the "Nymph carried off by a Faun" (1859), and "The Birth of Venus," of which he executed a copy in 1871 for New York, and another copy is in Philadelphia. He is also eminent as a portrait painter. In 1863 he succeeded Horace Vernet as a member of the academy of fine arts, and was appointed professor in the school of fine arts.

CABANIS, Pierre Jean George, a French physician and philosopher, born at Conac, in Saintonge, June 5, 1757, died at Rueil, near Paris, May 5, 1808. In his early studies, which he pursued at Brives, he made little progress. At the age of 14 he went to Paris, where he employed two years in reading the works of ancient philosophers, the writings of the fathers of the church, and those of modern philosophers, such as Rousseau, Voltaire, and Locke. He then passed two years in Poland as secretary of the prince bishop of Wilna. Upon his return to Paris, Turgot introduced him to Mme. Helvétius and her brilliant circle at Auteuil, where he became acquainted with D'Alembert, Diderot, Condillac, Baron d'Holbach, Franklin, Jefferson, and other men of eminence, and undertook to translate Homer into French verse. He afterward became the pupil of Dubreuil in medicine, and received his degree of doctor in 1788. When the revolution broke out in 1789, Cabanis espoused the popular cause. He became the physician and friend of Mirabeau, of whose last illness and death he published an account. He was also a friend of Condorcet, and procured for him the poison which enabled him to escape the scaffold. In 1789 he published *Observations sur les hôpitaux*. In 1795 he was appointed professor of

hygiene at the central school, and professor of clinical instruction at the medical school. He was active in the reorganization of medical instruction in the schools of Paris, Montpellier, and Strasburg. In 1797 he published a report to the council of 500 on the organization of medical schools, and *Du degré de certitude en médecine*, and in 1804 *Coup d'œil sur les révolutions et la réforme de la médecine*, in which he developed the first germs of his system. "The active principle of life and movement in animated bodies," says Cabanis, "which Stahl calls the 'soul,' is *oxz*, but it acts diversely in the organs according to differences of structure and function. It digests in the stomach, breathes in the lungs, secretes bile in the liver, and thinks in the brain." Condillac had explained all the actions of the soul by sensation; Cabanis wished to complete this system of philosophy by investigating and explaining the origin and nature of sensation. "All sensibility," he maintains, "resides in the nerves, and therefore all the moral affections and intellectual faculties reside in the nerves. Impressions are received on the peripheral nerves and carried to the nervous centres where they excite thought, feeling, and reaction in the organism. Distinctions between physical and moral nature are therefore vain, the moral faculties having their origin in the physical." He supported Bonaparte on his return from Egypt; and on the day after the 18th Brumaire, in the name and on behalf of the legislative assembly, he wrote the proclamation recommending the French nation to accept the revolution which had just been accomplished. Under the consulate he was named a member of the senate; but, disappointed by the reactionary policy of Napoleon, he withdrew from public life, and devoted his attention exclusively to science. The principal work of Cabanis is *Les rapports du physique et du moral de l'homme* (2 vols. 8vo, Paris, 1802; 8 vols., 1824), a portion of which had appeared in the *Recueil de l'institut national*. Cabanis before he died modified in many respects the views he had maintained in that work, and in a private letter to a friend, published after his death, states that it is impossible to conceive the existence of the universe without an intelligent first cause.

CABARRUS, a S. W. county of North Carolina; area, 850 sq. m.; pop. in 1870, 11,954, of whom 8,929 were colored. The surface is uneven, and in some places mountainous; the soil is of moderate but not uniform fertility. It is watered by branches of Rocky river, an affluent of the Yadkin. It produced gold in the early part of the present century. The North Carolina railroad crosses it. The chief productions in 1870 were 87,968 bushels of wheat, 268,560 of Indian corn, 47,590 of oats, 2,248 tons of hay, and 2,708 bales of cotton. There were 1,797 horses, 1,035 mules and asses, 2,469 milch cows, 3,945 other cattle, 4,667 sheep, and 18,276 swine. Capital, Concord.

CABARRUS, Francisco de, count, a Spanish financier, born in Bayonne in 1752, died in Seville, April 27, 1810. He was the son of a French merchant, and became a clerk of his father's correspondent at Saragossa, M. Galabert, whose daughter he married. His financial talents attracted the attention of the Spanish authorities, who adopted his plan of issuing paper money, and of a new royal bank, placing him at the head of it; and he founded in 1785 a Philippine island trading company and projected the canal of Segovia. Charles III. made him councillor of state, but after the accession of Charles IV. he was accused of dishonesty and imprisoned from 1790 to 1794, and was formally acquitted in 1795. He was next made a count and employed in diplomatic missions. He was appointed Spanish minister in Paris, but the directory declined to recognize him on the pretext of his French nativity. Charles IV. compensated him for the loss of this office by a gift of \$300,000; but in 1799 Godoy banished him from the court to Burgos, and afterward sent him out of the country as minister to Holland. In 1808 he was called back by Ferdinand VII. and appointed minister of finance and director of the royal bank, offices which he continued to hold after Joseph Bonaparte became king. He wrote much on mercantile and financial topics. His beautiful daughter Thérèse married M. de Fontenay, and afterward acquired celebrity as Mme. Tallien and princess of Chimay. (See CHIMAY.)

CABAT, Nicolas Louis, a French landscape painter, born in Paris, Dec. 24, 1812. He studied under Camille Flers, explored the picturesque regions of France and subsequently of Italy, produced his first work in 1833, and acquired celebrity as a landscape painter of the realistic school. His earlier paintings resemble those of the old Flemish masters, but his later ones display less vigor and charm of execution, and are more after the style of Poussin. Among his more recent works are "The Ravine of Villeroi" (1855), "Pond in the Wood" (1859), and "Solitude" (1865). In 1867 he was elected member of the academy of fine arts.

CABBAGE, a plant belonging to the order *crucifera* and genus *brassica*, the order comprehending also the scurvy grass, pepper grass, mustard, cress, radish, and turnip, and the genus including also the cauliflower, broccoli, borecole or sprouts, rape, colza, savoy, and kohlrabi. The *brassica oleracea*, from which all the forms of cabbage spring, is found growing wild on rocky shores and cliffs in England, with no appearance of a head. The cultivated cabbage is considered by some a monstrosity; but its varieties are well marked, distinct, and easily perpetuated, where care is taken to secure such conditions as will continue their exact habits. The cabbage is a biennial; the seed being sown produces a full-grown plant the first season, and the next season sends out shoots $1\frac{1}{2}$ to 2 ft. long, which bear small globular seeds in a great number of pods. The whole plant then

perishes. The large, solid heads of cabbage, now so familiar, have been produced from the wild plant by gradual improvement in soils, manures, and cultivation. To repeat them annually it is necessary to observe two points: 1. None but those heads presenting the best type of the variety should be saved for seed; they must be taken up with the roots before frost sets in, the useless outside leaves removed, and set in a cool, dark cellar, with the roots imbedded in soil, and packed as closely as possible. In spring they are set out about $2 \times 2\frac{1}{2}$ ft. apart in good garden soil, and no seed saved except from the most vigorous stalks. 2. They must not produce seeds near other plants seeding at the same time which belong to the same tribe, such as cauliflower, turnip, broccoli, &c., as they will mix through their flowers, the seed producing mongrel varieties. Much disappointment is experienced from using seeds carelessly produced for sale by seed growers. There are many very valuable varieties of cabbage, some suited to particular localities. For early use,



Cabbage Leaf and Flowers.

early York is an old favorite, but some prefer the early flat Battersea. Coming next in succession, the Winningstadt is excellent, heads compact, growth rapid. About New York, the late Bergen, flat Dutch, and best varieties of drumhead cabbages are preferred for late sorts. —Three crops are secured in a season; seeds of early and late sorts are sown in a moderate hot-bed in March, for the latitude of New York city, kept slightly moistened, with plenty of air at all times when the temperature is not too low. The plants are dusted with dry wood ashes, pulverized lime, or a little Scotch snuff, to keep off the fly, a small black insect which is a great pest, thinned to an inch apart, and kept free from weeds. When the beds outside are dry and warm enough, the plants are removed during a cloudy day, or in the afternoon, and the early sorts set with a dibble, 14 to 18 in., the later ones 20 to 22 in. apart each way,

watered, and allowed to take root before disturbing the soil about them. If the weather continues dry, the plants should be watered two or three evenings in succession. This planting gives the earliest cabbages, and summer cabbages, which come between the early and late crops. For a late crop the seeds are sown in an open bed, thinly, in drills 6 to 9 in. apart, in May, and transplanted from June 10 to July 1, in straight rows, 22 to 27 in. asunder each way. The cabbage is a rank feeder and an exhaustive crop. The soil should be a deep, rich loam, not only containing plenty of vegetable matter, but a full supply of potash, soda, and lime. A dressing of common salt, at the rate of 10 bushels per acre, will not only benefit the cabbage crop, but kill grubs and worms, which destroy the young plants rapidly. Hogpen manure ought never to be applied to the cabbage crop, as it disfigures the roots and destroys the plant. Composts of muck, wood ashes, lime, salt, and common yard manures, well decomposed, may be used in large quantities if well incorporated with the soil. Guano, dug deeply under, is good in all but very light sandy and gravelly soils. A first-rate superphosphate of lime, with one third its weight of guano mixed with it, is one of the best manures for a garden soil, or one which has always received common manures. This compound may be dissolved in water, and freely used to water feeble plants, or dug in about them with a hoe. As soon as young plants have taken root in the new bed, they should be hoed, the oftener the better, till the leaves shade the soil. In its younger stages, the cabbage must feed largely on carbonic acid, &c., by its roots; but as it increases in size, it uses the leaves more extensively; hence the necessity of early and frequent hoeings.

CABBAGE PALM (*areca oleracea*), the highest



Cabbage Palm (*Areca oleracea*).

of the American palms, often attaining an elevation of 150 ft., with a trunk not more

than 6 in. in diameter. It is found abundantly in the West Indies, and is very distinct from the East Indian species of *areca*. The leaves grow only from the top, and their sheaths are so close that they form the green top of the trunk $1\frac{1}{2}$ ft. in length. The inhabitants cut off this top, take out the white heart of 2 or 3 in. in diameter, consisting of delicate leaves closely folded together which have been protected from any access of light, and eat it either raw, fried, or boiled. A tree which has grown for half a century is often cut down for the single bud or cabbage which crowns it.

CABEÇA DE VACA. See NÚÑEZ, ALVAR.

CABEL, Marie Joseph, a Belgian singer, born in Liège, Jan. 31, 1827. After the death of her father, M. Dreullette, a former French army officer, she maintained her mother by giving music lessons. She married M. Cabel, and after studying at the conservatoire of Paris, she appeared at the Opéra Comique in 1849, in the *Val d'Andorre*, and at Brussels and Strasburg. In 1858 she appeared at the Théâtre Lyrique, Paris, in *Le bijou perdu*. Aubert composed for her *Manon Lescaut*, in which she appeared at the Opéra Comique in 1856. She also gained applause in *La fille du régiment* and *L'étoile du Nord*; in 1859 as Dinorah in *Le pardon de Plœrmel*; and in 1863, at the Théâtre Lyrique, in Mozart's *Così fan tutte*.

CABELL, a S. W. county of West Virginia, separated on the N. W. from Ohio by the Ohio river. A part has been recently taken off to form a portion of Lincoln county; former area 448 sq. m.; pop. in 1870, 6,429, of whom 123 were colored. It is watered by the Guyandotte, and traversed by the principal thoroughfare from the Ohio to Richmond. The surface is hilly, and the soil in many places good. The Chesapeake and Ohio railroad intersects the county. The chief productions in 1870 were 42,592 bushels of wheat, 167,600 of Indian corn, 31,586 of oats, 17,398 of potatoes, and 133,410 lbs. of tobacco. There were 765 horses, 861 milch cows, 2,345 other cattle, 4,025 sheep, and 3,866 swine. Capital, Barboursville.

CABES, Gulf of (anc. *Syrtis Minor*), an inlet of the Mediterranean, on the E. coast of Tunis in Africa. The towns of Cabea, or Khaba, and Sfax, or Sfakus, are situated on its shores. (See SYRTIS.)

CABET, Étienne, a French communist, born in Dijon, Jan. 2, 1788, died in St. Louis, Mo., Nov. 9, 1856. He was educated for the bar, and became attorney general of Corsica, from which office he was soon dismissed. He was sent to the chamber of deputies in July, 1831. There he made himself so obnoxious to the government by his speeches, pamphlets, and a journal, the *Populaire*, that he was indicted for treason, and withdrew to England, where he published the *Voyage en Icarie*, in which he elaborated his scheme of communism. In 1848 a band of 69 Icarians left France for the Red river in Texas, where Cabet, who assumed the

financial and general control of the affairs of the colony, had secured a large tract of land. The colonists suffered great hardships, and in 1850, upon the arrival of Cabet with another band, removed to Nauvoo, Ill., which had been abandoned by the Mormons. Cabet went back to France, where he obtained a reversal of a judgment which had been rendered against him for swindling his followers. He then returned to Nauvoo, where he presided over the colony until shortly before his death, when he was set aside. The Icarians held their property in common, and were esteemed for their industry and morality. Cabet published the *Révolution de 1830* (Paris, 1832), *Histoire populaire de la révolution française de 1789* (4 vols., 1840), and the *Almanach Icarien* (1843-'8).

CABINDA, a seaport town of Lower Guinea, in the territory of Loango, on the Atlantic, in lat. 5° 30' S., 50 m. N. of the mouth of the Congo; pop. about 16,000. On account of the fertility of the soil and its beautiful situation, it is sometimes called the paradise of the coast.

CABINET, a term first applied in England to that portion of the privy council supposed to possess more particularly the confidence of the sovereign, and to be consulted by him privately on important matters. It is only in modern times that the cabinet council has found a recognized place in the constitutional system, and been regarded as the responsible government. An administration in Great Britain is formed by some leading statesman, supposed to possess the confidence of the majority in the commons, who will be at liberty to take such office in the government as he may prefer, and to name his associates. He is looked upon as the prime minister or premier, and will associate with himself other members of the administration to form a cabinet. The number that shall compose this council is not definitely fixed, but the first lord of the treasury, the chancellor of the exchequer, the lord high chancellor, the first lord of the admiralty, and the five principal secretaries of state are expected under any circumstances to have seats in the cabinet; and it is customary to include also the lord president of the council, the lord privy seal, and some other ministerial functionaries. In some cases statesmen of distinguished ability are called in though they hold no office; as was the case with the duke of Wellington on several occasions, and later with Lord John Russell. The term administration is broader than that of cabinet, and includes with the members of that council all the principal officers of state, some 50 or 60 in number, whose places are vacated as of course on the formation of a new ministry, unless the incumbents are associated in the new combination. The cabinet is the head and directing body of the administration; it meets on call, though all the members are not necessarily summoned, and the premier on any occasion may summon those only whose advice he specially desires. The meetings are

private; the members are sworn to secrecy, which is to be preserved inviolate after their retirement from office. The prime minister here meets his associates on an equality, and important measures are determined by vote. On leading measures, however, the premier would not be expected to yield; and in case of irreconcilable differences of opinion between him and any one or more of his associates, he may insist upon their retirement from office. All important public measures are usually matured and important appointments agreed upon in these meetings, but the result must be communicated to the sovereign for approval. The administration must act as a unit, and in important matters must at all times be in accord with the house of commons. A vote of want of confidence by that body, or the rejection of an important ministerial measure, necessitates the resignation of the ministry, unless they choose to take the responsibility of a dissolution of the parliament, and an appeal to the people in a new election. Besides the control which the commons may exercise over the administration through a rejection of its measures, the members are also subject to impeachment for maladministration, or for pernicious advice to the sovereign, who is himself irresponsible, being supposed incapable of wrong except as influenced by his constitutional advisers. Diplomatic appointments and inferior positions in the executive department are held at the will of the existing administration. The premier is the usual channel of communication between the cabinet and the sovereign, who does not in person attend the meetings, and the latter is expected to accept and approve their measures so long as he retains them in office; but he may dissolve the ministry at any time, and commit to some statesman of his selection the formation of a new one. But the sovereign would not under ordinary circumstances do this, or be sustained therein, unless the commons had already demonstrated their want of confidence in the ministry by their votes. The administration must have representatives in both houses of parliament. The resignation of the premier is *ipso facto* a dissolution of the ministry; but any other member may retire or be dismissed without breaking up the administration.—In the United States the heads of departments consist of the secretaries of state, of the treasury, of war, of the navy, of the interior, the attorney general, and the postmaster general. The constitution empowers the president to require the opinion in writing of the principal officer in each of the executive departments, upon any subject relating to the duties of their respective offices. Washington originated the practice of consulting all the heads of departments on important measures, and by later presidents they have generally been convened for joint consultation, until cabinet meetings to determine the course of the administration on all questions of importance have come to be expected as a matter of course.

At these meetings the president presides. The cabinet, however, as a body of councillors, has no necessary place in the constitutional system of the United States, and each president will accord to it such weight and importance in his administration as he shall see fit. The president, not the cabinet, is responsible for all the measures of the government; and whatever is done by one of the heads of departments is considered as done by the president through the proper executive agent. In this fact consists an important difference between the executive of Great Britain and that of the United States; the acts of the former being considered those of his advisers, who alone are responsible therefor, while the acts of the advisers of the American executive are regarded as directed and controlled by him. In the United States, also, there is no premier, no leading member of the administration by whom the others are selected, but the president selects them all; and though the position of secretary of state has generally been regarded as the leading one, yet this must depend very much upon the nature and relative importance of the questions with which the particular administration has to deal, and the incumbent has not in the cabinet a recognized superiority over the other members. The members of the American cabinet cannot under the constitution have seats in congress; while those of the British cabinet are usually members of parliament, and must be newly elected on taking office. Another important difference between the British system and the American is that there is no constitutional principle in the latter which requires the cabinet to be in accord with the congress, or with either house thereof. The president selects for his chief advisers those who concur in his views, and he is not expected to change them because the opposition may be strong enough to defeat his measures in congress. It has frequently happened that the president's friends have for a considerable period been in a minority in one or both houses of congress.

CABIRI (Gr. *Κάβειροι*), certain divinities anciently worshipped in Egypt, Phœnicia, and Greece. Little is positively known respecting them. In Egypt there appear to have been eight; in Greece three, and perhaps more, who have been identified by some with Ceres, Proserpine, and Pluto, or with Jupiter, Minerva, and Mercury, and sometimes with Castor and Pollux and other divinities. The name is probably derived from the Semitic *kabir* (great), a title especially given to Astarte, the Phœnician Venus. They were sometimes called sons of Vulcan, on account of their being proficients in the art of metallurgy. They are represented as dwarfs with protuberant bellies. Sometimes they are represented as kindly, sometimes as malevolent. The rites of the Cabiri were solemnized in secret every year, and lasted for nine days. At Lemnos they were celebrated in the night,

women and children as well as men being admitted. The postulants underwent an examination as to their previous life, and were purified of all their crimes, even if they had committed murder. At Lemnos, during the nine days and nights, all fires on the island were extinguished, sacrifices were offered to the dead, and a sacred vessel was sent to Delos to bring back fresh fire; the Cabiri being supposed to accompany the vessel, upon the return of which the pure fire was distributed, and a new life was entered upon free from all past stain. There are indications that in some places the rites were attended with obscene orgies. The principal places in which the Cabiri were worshipped were Lemnos, Samothrace, Imbros, Thebes, Anthedon, Pergamus, Berytus, and Memphis. The Cabiri and their rites form one of the most perplexing subjects connected with Greek mythology.

CABLE, a strong rope or chain. The name has of late years been applied also to slender ropes used for telegraphic purposes, very likely on account of their great length. Cables are occasionally used to close the entrance of harbors, but most generally they serve to connect ships with their anchors. The greatest improvement ever made in the mooring of vessels is the substitution of the chain cable for the hempen one. A chain is much less bulky and much more pliable than a hempen cable of the same strength; it is consequently stored in much less space, and is handled more easily. On account of its great bulk, a hempen cable loses much of its weight in the water, and consequently assumes a position much less curved than a chain. The great curvature of a chain makes it yield and play as if it were elastic when the vessel gives sudden jerks, and thus the strain upon a chain from this cause is never so great as upon a hempen cable. On a rocky bottom a chain will simply be polished bright by attrition, where a hempen cable would be cut in a few minutes. When the bottom is strewn with heavy stones, or with projecting points of rocks, round which the cable winds itself during the various evolutions of the ship caused by winds and tides, a hempen cable is often cut, or at least greatly injured, while a chain cable does not suffer in the least, on account of its power of resisting side strain. On board vessels, the cables are named after the anchor with which they are used. The largest is called the sheet-anchor cable, used at sea; the next in size is the stream-anchor cable, used in rivers. Cables are made of various lengths, according to their size and to the service they are intended for. A cable's length is a measure of distance used by sailors, and is equal to 120 fathoms.—Hempen cables are large ropes of the kind denominated cable-laid. The fibres of hemp are first twisted into yarn; a number of yarns are twisted together into a strand; three or four strands are twisted into a rope denominated plain-laid; three or four ropes, used as strands, are twisted to-

gether to make the cable. The twist is reversed at each successive operation; that is, the yarn is formed by twisting the fibres from right to left, the yarns are twisted together from left to right, &c. It is customary to designate the size of a hempen cable by the length of its circumference, and that of a chain cable by the diameter of the rod of which the links are made. The largest usual size of cable is 24 inches circumference; it weighs 1 cwt. per fathom, is made of 8,000 threads, is equal in strength to a chain 2½ inches in diameter, and is tested to carry safely 80 tons. Hemp in its natural state is stronger than when wet or tarred; nevertheless, it is advantageous to tar the cordage which is to be used at sea, as tar protects it against water, which would weaken and ultimately rot it. It is obvious that the process of tarring after the cable is made is imperfect, and simply better than nothing, as the tar does not reach the core; the true way is to tar the yarns of which the ropes are made.—As early as 1684 a patent was obtained by Philip White, an English blacksmith, for mooring ships with chains. In 1804 John Slater, a surgeon in the English navy, patented a chain cable, but want of capital prevented him from demonstrating by experiments the value of his invention. In the year 1811 Capt. Brown, of the *Penelope*, 400 tons burden, made a voyage of four months to the West Indies, using a chain cable with twisted links. During the following years several vessels were saved by their iron cables, and thenceforward the change from hemp to iron proceeded uninterruptedly, till at the present time it would be difficult to find a ship without a chain cable on board. The form of links adopted by Capt. Brown was most imperfect; several other shapes were successively tried, till the best form was found and patented in England by Brunton. The general shape of Brunton's link is that of an ellipse (see



FIG. 1.

fig. 1). The inside curve, at each extremity of its long axis, is of the same curvature as the rods used to make the chain. In this manner there is just room enough for the next link, and no more. Across the link in the direction of the small axis is a cast-iron stay enlarged at its extremity, having a groove in each end to embrace a portion of the link. At certain intervals along the chain are placed swivels, which together with the studs prevent the cable from getting into kinks and becoming unmanageable. If an obstacle is opposed to the side of the chain, the link or links acted upon may assume two different positions: the link may rest against the obstacle by its side, the axis of the stay being perpendicular to the face of the obstacle, in which position the link is strongest, as all its parts brace each other to prevent the bending of any; or the link may rest flat against the obstacle, in which position it is very weak; but this cannot hap-

pen if the obstacle is large, as in such case the next links would rest first against it by their sides, and if the obstacle is small, it is pressed between the sides or the back bone of the two next links, which close upon it and crush it to pieces. The links wear out much faster by their friction against each other than by any other cause. Experience has taught that the ends where the friction is greatest should be of rod iron of a larger diameter than that of the sides; the rods are therefore manufactured with swellings at the places which are to form the ends. Several simple machines are used to manufacture chain cables. The successive operations are as follows: 1, heating the round bars of iron red-hot; 2, cutting them of the required length, but with opposite bevels (*a*, fig. 2); 3, bending the rods around an elliptic mandrel. One end is placed against the side of a

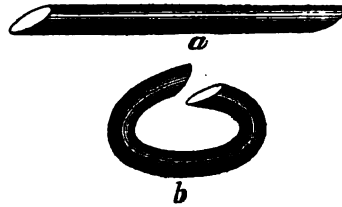


FIG. 2.

vertical mandrel, and held there by a vice attached to the last, and a lever provided with a projecting pin extending outside the rod is made to describe an ellipse, carrying the hot rod around the mandrel; this lever does not turn around a pin in the centre of the mandrel, but is attached to two slides, which are forced to move in grooves occupying the position of the two axes of the mandrel; thus the pin of the lever describes an ellipse parallel to the periphery of the mandrel. 4. The new link (*b*, fig. 2) is hooked to the last preceding link of the chain in process of making, and welded at a small forge. 5. While it is still hot, the cast-iron stay is introduced, and the link placed in a press, which compresses the two sides close upon the stay, at the same time that it makes these sides straighter; during this last operation an auxiliary straight rod is placed inside the end of the link, where the next link is to come, to prevent its closing. There are sometimes circumstances in which it is necessary to sever or slip (as it is called) a cable, or to shorten or lengthen it; this is done by means of a bolt and shackle substituted for a link every 15 fathoms, the portion of the cable between the shackles being called a length or "shot."

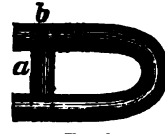


FIG. 3.

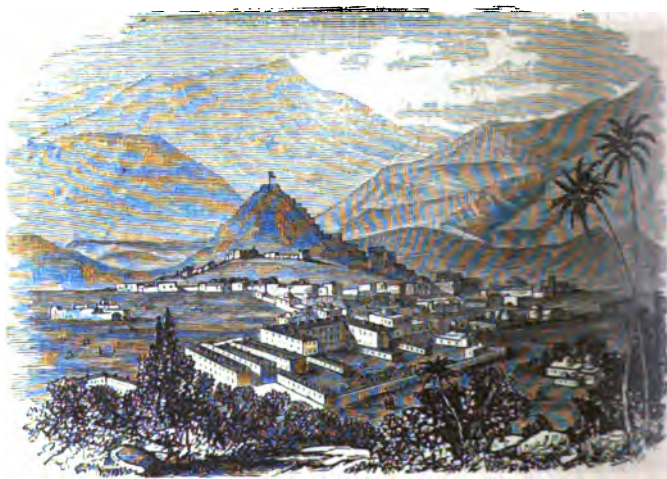
The shackle is represented in fig. 3, in which *a* is the bolt, secured in its place by the pin *b*, which is again held in its place by having its head in a conical chamber filled with lead. One of the links

next the shackle is larger and heavier than the others, for the purpose of receiving the shackle. The shackle bolts and pins are very important parts of a chain cable. The pin, as well as the bolt, is made of iron, and should be covered with white lead before being put in its place. These pins sometimes become rusted through neglect, which may occasion great difficulty or loss when it becomes necessary to unshackle speedily. For smaller vessels cables are also made with links without stays. These are called short-link cables, the links being shorter and having the sides parallel, and the curve in each end just large enough to receive the fellow link. Improvements have been made in the machinery for making chains, in which operations formerly executed by hand are performed mechanically; but it is doubtful whether they would succeed as well on a large as on a small scale.—The manufacture of chain cable was begun in the United States in the year 1820, by Messrs. Cotton and Hill of Boston. They worked successfully during 80 years, when, finding they could no longer compete in cheapness with the importers of English-made cables, they closed their works. Several instances have since happened of vessels being lost by the breaking of the chain in fair weather, showing conclusively that the English makers had been using very inferior iron, and that the certificates of proof test accompanying the cables were either spurious, or had been delivered for other cables than those sold. These facts called for action on the part of ship-owners and insurance companies, and Messrs. Cotton and Hill were induced to reopen their works in 1857. A large amount of property, not to speak of human life, has been lost at sea and on the American lakes by the use of cheap chains. All the cables and other chains as well as the anchors used in the United States navy are made in the foundry at the navy yard in Washington. The lengths are 15 fathoms between the shackles, and the cable usually contains 11 lengths or 165 fathoms. (See SHIP.)

CABOCHE, Simonet, leader of a French faction in the 16th century, in the pay of John the Fearless, duke of Burgundy, against the Armagnac or Orleans faction. He gave his name to the gang of Cabochians or *écorcheurs* (flayers), chiefly composed of the powerful corporation of Paris butchers, of which he was a member, who were strengthened by the theo-

logians of the Sorbonne and other disaffected persons. They seized the Bastille in 1413, invaded the royal palace, and forced Charles VI. and the dauphin to wear a white hood, their emblem of liberty, and to pass the *ordonnance capochienne* as a guarantee of political reforms. They accused Pierre des Essarts, a former finance minister and provost, of peculation, and instigated his execution. They were at last put to flight by the citizens under the command of the dauphin, eldest brother of Charles VII., after having made Paris for several years the theatre of pillage and murder. Although their power was broken, they afterward recommenced a reign of terror, Cabochie being the most notorious of the ringleaders; but he was soon lost sight of.

CABOOL, or Cabul. I. The N. E. part of Afghanistan, bounded N. by the Hindoo Koosh and Kafiristan, E. by the Punjaub, S. by Swistan, S. W. by Candahar, and W. by the region of the Hazareh. It is about 250 m. in length from N. to S., and about 150 in breadth. It is traversed in the north, where it is very mountainous, by the Cabool river, flowing E. from the Hindoo Koosh to the Indus and its numerous affluents. The south is watered by the Gomul, another affluent of the Indus. It is inhabited by Durrani, Ghiljies, Tajiks, and other tribes. (See AFGHANISTAN.) II. The capital of Afghanistan, situated on the Cabool river, immediately above its confluence with the Loghur, at the W. extremity of a plain in a recess formed by the junction of two mountain ranges, 6,896 ft. above the sea; lat. 34° 30' N. lon. 69° 6' E.; pop. estimated at 60,000. The



Cabool.

citadel, Bala Hissar, or upper fort, built on the declivity of a hill S. E. of the town, contains the palace and other buildings. The town is not surrounded by walls, but is in part covered by weak ramparts. Internally it is divided and subdivided by walls, through which the

ifferent parts of the city communicate with each other by narrow gates. The streets are narrow, and the houses, built of sun-dried bricks and wood, are two or three stories high, with flat roofs. The serais, or public inns, are numerous, but neither convenient nor elegant. The baths are filthy. The river is crossed by three bridges, one of which is a substantial structure of brick and stone. The climate, from the proximity of snow-covered mountains and the elevation of the city, is severe during the winter, which begins in October and lasts through March. In this season the wealthy citizens remain within doors, but in summer they live almost entirely in the open air. The caravans between Persia and India pass through the city, and it is a place of considerable trade, being the emporium for the valley of the river. Its own industry, which is not important, consists chiefly in the manufacture of iron ware, leather, cotton, and shawls.—Cabot was for a short time the capital of the emperor Baber. In 1738 it was taken by Nadir Shah and annexed to his Persian dominions. In 1774 Timour, the son of Ahmed Khan, made it the capital of the Durrani empire, and it so remained until the downfall of the dynasty. Dost Mohammed Khan then took possession of it, and held it until he was ousted by the British in 1839. In 1842 the British destroyed the handsomest of the bazaars for which the city was celebrated, in punishment for the treachery of its inhabitants, and damaged the Bala Hissar.

CABOT, George, an American senator, born at Salem, Mass., Dec. 3, 1751, died in Boston, April 18, 1828. After having made several voyages as master of a ship, he was at the age of 25 chosen member of the provincial congress of Massachusetts, where he opposed an attempt to fix by law a maximum price for provisions. In 1788 he was a member of the state convention which adopted the federal constitution, and in 1789 was elected to the senate of the United States, where his knowledge of commerce and the laws of trade was of great service. He was appointed the first secretary of the navy, May 3, 1798, but declined. He belonged to the federal party, and in 1814 was president of the Hartford convention, after which he retired from public life.

CABOT. I. John, or *Giovanni Caboto*, or, in the Venetian dialect, *ZUAN CALBOT* or *ZUAN CABOTO*, the discoverer of the continent of North America. His name first occurs in the archives of Venice; on March 28, 1476, denization was granted him after the customary residence of 15 years. The full entry of his denization would probably have named his birthplace; but it is not to be found. In the year 1495, and probably for years before, he resided at Bristol with his wife, who was a Venetian woman, and three sons. At that time it had become the received opinion that the earth is a sphere, and that the shortest and readiest way of reaching the Indies was by sailing west. This opinion was confirmed by

the voyage of Columbus, who was thought to have reached the outlying isles of the Indies. On March 5, 1496, John Cabot and his three sons obtained a patent from Henry VII., authorizing them or either of them, their heirs or their assigns, to search for islands, provinces, or regions in the eastern, western, or northern seas; and, as vassals of the English king, to occupy the territories that might be found, with an exclusive right to their commerce, on paying the king a fifth part of all profits. Under this charter, John Cabot, some time in May, 1497, embarked in a single vessel, accompanied by his son Sebastian, and sailed west, as he said, 700 leagues, when, on June 24, he came upon land which he assumed to be a part of the dominions of the Grand Cham, but which was in reality the coast of Labrador. A letter of that year represents him as having sailed along the coast for 800 leagues; he landed, but saw no person, though he believed the country not uninhabited. He planted on the soil the banners of England and of Venice. On his return he discerned two islands to the starboard, but, for want of provisions, did not stop to examine them. He reached Bristol in August. His discovery attracted great attention, and on Feb. 3, 1498, Henry VII. granted John Cabot special authority to impress six English ships at no higher charges than were paid for ships taken for the king's service, to enlist companies of volunteers, "and theym convey and lede to the londe and iles of late founde by the seid John." This license has been erroneously called a second charter; it was not so; the charter of 1496 was still valid and sufficient. This license is the last record that has been found of the career of John Cabot. He himself made no voyage under it, from what cause can only be conjectured. Neither the time nor the place of his death, nor his age, is known. Neither is it known what country gave him birth. He was a Venetian only by denization. As he is found residing at Bristol, the conjecture would arise that he was born an Englishman; but the license granted him in 1498 calls him "Kabotto, Venecian," a phrase which in our day, and still more in those days of stricter feudal rule, clearly implies that he was not a natural born subject of the king of England. Had he been so, he would have been claimed as an Englishman. Thus not even the native country of the discoverer of the North American continent can be ascertained. The authorities respecting John Cabot are, the Venetian archives; the patent granted him in 1496; the license in 1498; a letter dated Aug. 23, 1497, from Lorenzo Pasqualigo, a merchant at London, to his brothers at Venice; and the legend on the map of Sebastian Cabot, cited in Hakluyt, giving June 24, 1497, as the date of the discovery of the continent. In 1566 there was at Oxford a copy of Sebastian Cabot's map on which the date of the legend was 1494. Another copy with the same date has been discov-

ered in Germany; but the legend is not by Sebastian Cabot himself, and the original charter of 1496, the letter of Pasqualigo in 1497, and the license of 1498, combine to prove the date 1494 to be an error. The better knowledge of the career of John Cabot is particularly due to the researches of an accomplished English scholar, Rawdon Brown.—M. d'Avezac, in the *Bulletin* of the French geographical society for October, 1869, cites from the first edition of this Cyclopædia the preceding argument in regard to the date of the original discovery, and says that the true date in the map of Sebastian Cabot, on an original copy preserved in the geographical cabinet of the imperial library at Paris, is 1494, and that the date of 1497 in Hakluyt is a typographical error. The legend to this map is in Latin and Spanish. The portion relating to the Tierra de los Bacallacos, according to D'Avezac, reads: "That land was discovered by John Cabot, Venetian, and Sebastian Cabot his son, in the year of the birth of our Saviour Jesus Christ M.CCCC.XCIII. the 24th of June [at 5 o'clock] in the morning; to which has been given the name of First Land Seen; and to a great island which is very near the aforesaid land has been given the name of St. John, from having been discovered on that day." With respect to the legend, M. d'Avezac adds: "If any one could for an instant doubt that the whole was the actual work of Sebastian Cabot, it is only necessary, in order to remove any hesitation, to read the lines of the *Retulo del auctor*, beginning thus: 'Sebastian Caboto capitan y piloto mayor de la Sacra Cesarea Catolica Majestad del Imperador Don Carlos quinto deste nombre y Rey Nuestro Sennor, hizo esta figura extensa en plano, anno del nascimiento de nuestro Salvador Jesu Christo de M.D.XLIIII annos,' &c." Hence M. d'Avezac argues that the charter of March 5, 1496, was granted in consequence of this previous discovery. He also asserts, upon what he considers good proof, that John Cabot was a Genoese by birth. II. Sebastian, son of the preceding, a cosmographer, and the discoverer of the coast line of the United States as far south as the Chesapeake. The time and the place of his birth are uncertain. Eden says, "Sebastian Cabotte told me that he was borne in Bristowe, and that at four yeare old he was carried with his father to Venice;" but Contarini, the Venetian ambassador at the court of Charles V., relates in his diary that Sebastian Cabot informed him he was born in Venice, but bred in England; and this is confirmed by the denization of John Cabot at Venice in 1476, after a residence there of 15 years. The time of Sebastian's birth seems to have been not earlier than 1475, nor later than 1477. There is no sufficient reason to doubt that he accompanied his father in the voyage in which North America was discovered. In May, 1498, he, without his father, led forth two ships and a large company of English volunteers from Bristol, in search of a short

northwestern passage to China and Japan. He sailed so far to the north that in the early part of July the light of day was almost continuous. Finding the sea full of icebergs, he turned more to the south, and arrived at land, which most persons believe to have been Newfoundland. Pursuing his search, he reached the mainland of North America, landed in several places, and saw natives clad in the skins of beasts and making use of copper. He proceeded as far south as the latitude of the straits of Gibraltar, and as far west as the longitude of Cuba. His object had been to find a passage to Asia, and though he discovered an immense territory under a temperate sky, his voyage was considered a failure. Vasco da Gama had reached India by way of the Cape of Good Hope, and filled the world with his fame. The discoveries of the Cabots were so little valued that the family suffered the patent granting them the exclusive privilege of trade to be lost. On the death of Henry VII., Sebastian Cabot was invited from England by Ferdinand of Spain, father-in-law of Henry VIII., and was appointed one of the council for the New Indies. In 1518 he was named pilot major of Spain; in April, 1524, he attended the congress assembled at Badajoz to decide on the conflicting claims of Spain and Portugal to the Moluccas. All the while, and during his whole life, the great object of his ambition was the discovery of a direct passage to Asia. Having in early life failed to find one by the northwest, in 1526 he commanded an expedition sent out in search of a southwestern passage. In this pursuit, in 1527 he entered the river Plata. Remaining in those regions for seven years, he discovered Paraguay. He did not pass round the continent at the south, but returning to Spain, reached Seville near the end of July, 1530. In the first year of the reign of Edward VI., on Oct. 9, 1547, the privy council issued a warrant "for the transportation of one Shabot, a pilot, to come out of Hispania to serve and inhabit in England;" and he came at the summons in 1548, with his mind still bent on finding a short passage to the Indies. On Jan. 6, 1549, the king gave him a pension of 250 marks, or £166 13s. 4d., "in consideration of good and acceptable service done and to be done" by him. On Jan. 19, 1550, the emperor Charles V. applied for his return, but without result. His influence was observable in inspiring confidence and enterprise among the merchants of England; and in March, 1551, "Sebastian Cabote, the great seaman," received from the king a special reward of £200. The patent granted to the family by Henry VII. in 1496 having been lost, he obtained of Edward VI. a copy of it from the rolls, and prepared to prosecute a new voyage of discovery, still in search of a passage to the Indies. In 1558 a company of merchants, of which he was the president, sought to find it by way of the northeast, expecting to turn the North cape of Norway, and sail southerly to

China. One of the two ships was frozen up in a Lapland harbor, and all the persons on board perished with cold; the other discovered Archangel, and opened a commerce between England and Russia. On Sept. 9, 1558, soon after the accession of Queen Mary, the emperor Charles V., through his ambassador, again and very earnestly made request that Sebastian Cabot should be sent back to his service; of so much importance did he seem even then in his great old age. But Cabot refused to leave England. A new company was formed for discovery on Feb. 28, 1556, of which he was a partner and the president. On Monday, April 27, 1556, accompanied by divers gentlemen and gentlewomen, he went on board the pinnace the *Serch Thrift*, which was on the eve of sailing, and distributed most liberal alms; then going on shore, he and his friends gave a banquet to the ship's company, and for very joy at the forwardness of the intended discovery the octogenarian cosmographer entered into the dance himself. At parting, he commended the ship's company to the governance of Almighty God. On May 27, 1557, he resigned his pension, and on the 29th of the same month he received a new grant of it under a different form. These are the last authentic notices of Sebastian Cabot, one of the most remarkable men of his age. Where he died is not certain, though it was probably in London; the precise time of his death is also unknown, and no one can tell his burial place.—The best work on Sebastian Cabot is the memoir by Richard Biddle (Philadelphia, 1831), but further materials have been contributed by Rawdon Brown, and by Varnhagen in his *Historia do Brasil*. One of his maps has lately been found in Germany, and has been published by Jomard at Paris in the *Monuments de la géographie*. In preparing the present article, some unpublished manuscripts have also been used.

CABOTVILLE. See CHICOPEE.

CABRA (anc. *Agabrum*), a town of Andalusia, Spain, in the province and 80 m. S. E. of Cordova; pop. about 12,000. It lies between two hills, upon a river of the same name, and contains a Dominican convent, cathedral, college, hospital, and theatre. Near by are mineral springs, the crater of an extinct volcano, and the fine grotto of Jarcas. There are manufactories of tiles, linen, and woollen, and an annual fair held in September.

CABRAL, Francisco, a Portuguese missionary, born at Covilhão in 1528, died in Goa, India, April 16, 1609. At the age of 26 years he became a Jesuit, and was afterward appointed professor of philosophy and theology at Goa, and superintendent of the Jesuit schools in India. He proceeded thence to Japan, where he made many converts, and also had direction of the missions in China. Returning to Goa, he was for 88 years superior of the Roman Catholic educational establishment in that place. A series of letters from him may be

found in the *Litteræ Annus* of the society of Jesuits.

CABRAL, Pedro Alvarez de, a Portuguese navigator, died about 1526. In March, 1500, he was placed in command of the expedition of 15 vessels fitted out by Emanuel, king of Portugal, after the discovery of the route to India around the Cape of Good Hope by Vasco da Gama. After passing the Canaries he was carried so far to the west that he reached the coast of Brazil, arriving a few months after its first discovery by Pinzon, the companion of Columbus. He took possession of the country in the name of the king of Portugal, and sent home a vessel to announce his discovery. He then continued his voyage for India by way of the Cape of Good Hope; but before reaching the cape he encountered a severe storm and lost four of his vessels. Cabral stopped at Mozambique for repairs, and sailed thence with only six vessels. He visited several points of India, among which was Calicut, where he established a factory, and returned to Lisbon in July, 1501, with valuable cargoes of Indian merchandise. No further mention is made of him in history.

CABRERA, Ramon, count of Morella, a Spanish general, born at Tortosa in Catalonia, Aug. 31, 1810. When civil war broke out in 1838, after the death of Ferdinand VII., between the partisans of his brother Don Carlos and Queen Isabella II., Cabrera joined the Carlists at the head of a small band of guerillas, and made himself remarkable both by his valor and cruelty. His zeal for the Carlist cause, which he considered that of the church, became ferocity when, in 1836, his mother was put to death by Agustin Nogueras, one of the queen's generals. In revenge he laid waste Aragon, Valencia, and Andalusia, and showed no mercy to the Christinists who fell into his hands. Having taken the fortress of Morella, he was in 1838 made by Don Carlos lieutenant general and count of Morella, and continued the struggle even after Maroto's surrender to Espartero at Vergara, but was finally compelled to escape to France (July 6, 1840), where he was arrested and imprisoned for a short time. Although in 1845 he opposed the abdication of Don Carlos in favor of his son, the count de Montemolin, he accompanied the count to London in September, 1846, and endeavored without success to create an interest in his favor. After the French revolution of 1848 he landed in Catalonia, and was defeated and severely wounded at Pastoral, Jan. 27, 1849. Escaping once more to France, he went thence to England. In the interest of the Carlists he visited Naples in July, 1850, with his wife, an English woman, but was expelled, and has since lived in retirement.

CACAO, a tree of the genus *theobroma*, belonging to the natural order *sterculiaceæ*, the seeds or beans of which furnish the cocoa of commerce. It is called by the Mexicans *chocolat*, from which comes the English chocolate. It is indigenous in Central and South Ameri-

ca, and in the West India islands, sometimes forming whole forests, and is extensively cultivated in tropical countries between lat. 25° N. and 25° S., flourishing best between the 15th parallels, and growing at an elevation of 600 ft. above the sea. It is an evergreen, producing fruit and flowers throughout the year. If unchecked, the tree attains a height of about 80 ft., and resembles in size and shape a black-heart cherry tree. The leaves are smooth and oblong, terminating in a sharp point. The flowers, which are small, appear in clusters, and are composed of five sepals, five petals, and five stamens with double anthers. The fruit resembles a short, thick cucumber, 5 or 6 in. long and 3½ in. diameter, varies in color according to the season from bright yellow to red and purple, and contains 20 to 40 beans. These are arranged in a pulp of a pinkish white color, in five rows. Their size is commonly about that of a sweet almond, but thicker. In



Theobroma cacao.

this respect, however, there is a great difference in the trees of different countries. In Central America the fruit is much larger, being from 7 to 9 in. in length and 3 to 4 in. diameter, and contains from 40 to 50 seeds; in the West India islands, and in Berbice and Demerara, it is so small as to contain only from 6 to 15 seeds. The rind of the fruit is smooth, thick, tough, and tasteless. The pulp which encloses the beans is a sweet, slightly acid substance, something like that of the watermelon, and is used for food. The fruit matures for gathering in June and December. The beans when separated from the pulp and dried in the sun are ready for the market; but in some countries they are placed in large tubs and covered for the purpose of undergoing a slight fermentation, by which they lose some moisture and a portion of their bitter and acrid qualities. While fermenting, they are regularly stirred every morning. The same object is attained in Mexico and elsewhere by burying

the beans in pits in the earth, and they are finally sun-dried. The best beans when gathered are full, plump, and shining. The shell is of a dark brown color, thin and brittle, and furnishes the cocoa shells of commerce. The kernel is divided into several unequal parts slightly adhering together, and having an agreeable aroma and a slightly bitter but pleasant taste. The seeds yield by expression an oil that is very nutritive and acts as an anodyne; but the tree is cultivated for cocoa and chocolate, and the best producing plantations are in the West Indies, New Granada, Ecuador, and Brazil.

CÁCERES. I. A W. province of Spain, forming the N. part of Estremadura; area, 8,006 sq. m.; pop. in 1867 (estimated), 803,700. The northern portion is a picturesque mountain land, rich in water and woods; the south is a plateau covered with pastures; between them the Tagus flows through a valley containing extensive oak forests. The chief towns are Cáceres, the capital, Trujillo, Guadalupe, Alcantara, and Plasencia. II. A city (anc. *Cæcilis Castra*), capital of the province, situated on elevated ground 24 m. W. of Trujillo, with which it is connected by a causeway, and 148 m. S. W. of Madrid; pop. about 14,000. The old town on the summit of a hill, is surrounded by a strong wall with five gates. The newer and more important part is built around the old town, and contains a handsome square, a college, convents, an episcopal palace, a place for bull fights, many fine buildings, and numerous manufactories. The city was founded by Q. Cæcilius Metellus in 142 B. C. It was taken from the Moors by Alfonso of Castile in 1142, and having been recaptured by them, was again taken in 1184 by Ferdinand II. of Leon. Roman and Moorish antiquities are found there.

CACHALOT. See WHALE.

CACHE, a N. E. county of Utah, bordering on Idaho, watered by Bear river and its tributaries; area, 700 sq. m.; pop. in 1870, 8,229. The chief productions in 1870 were 18,577 bushels of wheat, 3,074 of Indian corn, 7,533 of oats, 2,547 of barley, 21,837 of potatoes, and 2,448 tons of hay. There were 428 horses, 798 milch cows, 804 other cattle, 3,167 sheep, and 121 swine. Capital, Logan.

CACHET, Lettres de (Fr. *cacher*, to hide), a kind of warrant formerly in use in France. They were so called in distinction from the *lettres patentes*, or open letters, which were warrants issued in the name of the king, sealed with his great seal of state, and registered by parliament. The *lettres de cachet* were closed with the king's petty seal, and were used for ordering persons to quit Paris or France, or to be arrested and imprisoned. They were issued upon the royal authority alone, and not in pursuance of the judgment of a court. Numbers of them were sometimes prepared with a blank for the name of the person, and furnished to the lieutenant general of police at Paris for

use in emergencies, and occasionally also to court favorites, who used them as instruments of personal revenge. Abuses of this kind were very frequent during the reign of Louis XV. The punishments directed by these warrants continued during the king's pleasure, and often for long periods. They were abolished by the constituent assembly early in the revolution of 1789.

CACHEXIA (Gr. *κακός*, bad, and *εξίς* condition), a term used in medicine to signify an unnatural and unwholesome condition of the body, not immediately and directly dependent on local disease, but rather on the long-continued action upon the system either of slow pathological changes going on in some vital organ, or of morbid climatic influences. A condition of cachexia is marked by a sallow or dusky complexion, loss of flesh, a diminution of muscular strength and of the general nervous activity, and a liability to succumb easily under various incidental disorders, which vary in different cases. Thus we have the cancerous, tuberculous, and syphilitic cachexia, the cachexia of Bright's disease, malarial cachexia, &c. In many cases, the cause of the morbid condition being itself irremovable, the cachexia, when once established, is necessarily fatal, as in cancer and Bright's disease. In other instances, as in malarial cachexia, the indications for cure are: first, to remove the patient from the locality in which the affection originated to a purer and more bracing atmosphere; and secondly, to recruit the bodily powers by judicious exercise, nutritious food, and the administration of tonic and sustaining remedies.

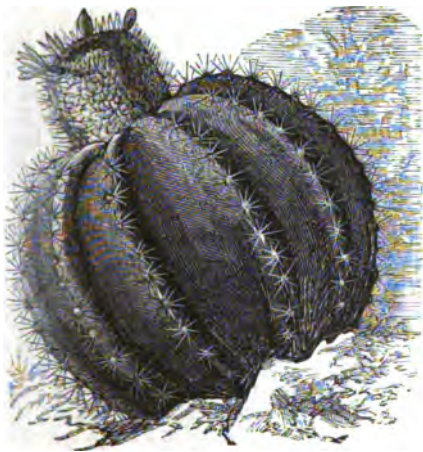
CACTUS, a genus of plants, the type of the natural order *cactaceæ*, comprising numerous species, all of which are natives of America. The name was originally given by Theophrastus to a spiny plant of Sicily. The cactuses

and bristles. The structure of many of the species is singular and grotesque, and their appearance is interesting by reason of the roughness of the stalks and the beauty of the flowers. Found chiefly in the hot stony places of tropical America, their stems are filled with an abundant juice, which, being enclosed within a tough and impermeable skin, enables them to support a sluggish vital action without inconvenience in a parched soil. They vary in stature from creeping stems to angular ascending trunks, sometimes 30 feet in height. The flowers, varying from pure white to rich scarlet and purple, are much increased in size and brilliancy by cultivation in gardens and green-houses. They thrive, however, only in the



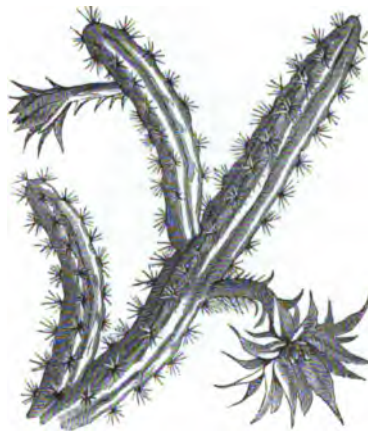
Cactus grandiflorus.

poorest soil. More than 60 species of cactuses have been described. The *C. melocactus*, the great melon thistle, or Turk's cap, grows from the apertures of rocks in the dryest and hot-



Cactus melocactus.

have fleshy and succulent, globular or columnar, often deeply channelled and many-jointed stems, usually leafless, but armed with spines



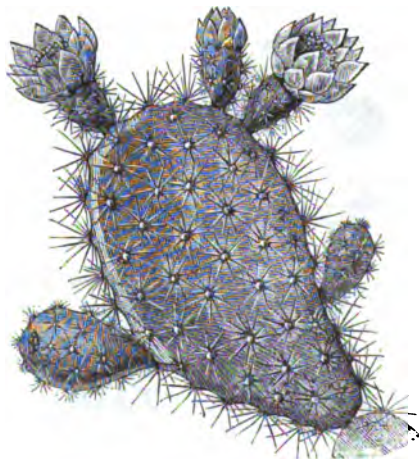
Cactus flagelliformis.

test parts of America; it appears like a green melon, with deep ribs, set all over with sharp thorns, and was likened by Linnæus to a hedgehog; it has on the top a small discoid, villous cap, from which the flowers grow in a circle; it attains the height of four or five feet in the West Indies, and has been brought to more than half this size in England; in times of drought they are ripped up by the cattle and their moist internal part greedily devoured. The *C. grandiflorus* is remarkable for its large, beautiful, sweet-scented flowers, which begin to open in the evening, and close again for



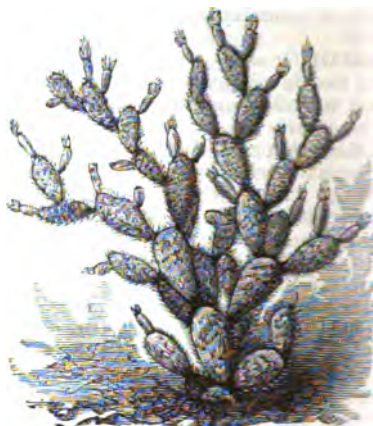
Cactus Opuntia.

ever before morning; the calyx, nearly one foot in diameter, is of a splendid yellow, enclosing pure white petals, and the flower during the five or six hours of its continuance is hardly surpassed in beauty; its structure is such that in cultivation it may be trained against a wall. The *C. flagelliformis* is a more



Cactus tuna.

delicate species than the preceding, with a greater number of smaller pink flowers, which keep open three or four days; its slender trailing branches require support. The *C. Opuntia*, prickly pear, or Indian fig, derives its name



Cactus cochiniillifer.

from Opus, in Greece, where it was indigenous although, like the others, a native of America: it also grows wild in Italy, and flourishes in the lava at the foot of Mount Etna; it is cultivated in England and America for its fruit. The *C. tuna* is used for hedging; three rows of it were planted as a boundary when the island of St. Christopher was divided between the English and the French. The *C. cochiniillifer* is the chief nourishment of the cochineal insect: the delicate red juice of the fruit imparts a tinge to the urine. All the species of cactus are best cultivated in a sandy loam mixed with brick rubbish.

CACUS, a giant, said to have been the son of Vulcan, and represented by the classic poets as a monster who continually vomited forth fire and smoke. He dwelt in a cave on Mount Aventine, and was the terror of the inhabitants of the surrounding country, whose cattle he stole and dragged backward into his den, so that his cave could not be discovered by their tracks. Having stolen from Hercules some of the cattle of Geryon, he was slain by that hero. The story is told by Livy and Virgil.

CADAHALSO, or Cadalso, José de, a Spanish author, born in Cadiz, Oct. 8, 1741, died at Gibraltar, Feb. 27, 1782. He entered the army, distinguished himself in the war against Portugal, and afterward devoted himself to science and literature, and encouraged the literary efforts of Jovellanos and Melendez Valdes. War having broken out with England, he joined the army which invested Gibraltar, was promoted to the rank of colonel, and was killed by a shell. He wrote a tragedy, *Sancho Garcia*, which was published in 1771 under the name of Juan del

Valle. *Los eruditos á la violeta*, a prose satire on superficial scholarship (1772), *Los ocios de mi juventud*, and *Poesías* (1773), were published under the name of José Vasquez. After his death was published *Las cartas marruecas*, his most popular prose work, in the style of Goldsmith's "Citizen of the World." His lyric poems, and especially his anacreontic odes, have given him a lasting place in Spanish literature. His complete works were published in the *Colección de obras en prosa y verso* (best edition, with biography by Navarrete, 8 vols., Madrid, 1818).

CADAMOSTO, or *Ca da Mosto*, Luigi, an Italian navigator, born in Venice in 1432, died about 1480. He took passage for the Netherlands in 1454, but the vessel was forced by contrary winds to put in at Cape St. Vincent in Portugal. Entering the service of Prince Henry, he embarked upon a vessel of 90 tons in March, 1455, for the exploration of the coast of Africa. Having passed Cape Blanco and explored the river Senegal, he continued his voyage southward, and off Cape Verd was joined by two other vessels in the service of Portugal. The three vessels explored the coast as far as the river Gambia, at the mouth of which they were attacked by the natives; they then returned to Portugal. The next year Prince Henry sent Cadamosto with another expedition, which was compelled by a storm to keep off from the coast, and discovered the Cape Verd islands. He then sailed to the Gambia, entered its mouth and traded with the natives, and afterward proceeded as far as the Rio Grande. Upon the death of Prince Henry in 1463, Cadamosto returned to Venice. He wrote an account of his voyages, *El libro de la prima navigazione per oceano a le terre de negri de la Bassa Etiopia* (Vicenza, 1507).

CADDIS FLY, the popular name of the family of *phryganida*, neuropterous insects with broad and parallel-veined wings, and long antennæ. The larvæ live at the bottom of ponds and streams, in cases made of bits of wood, grains of sand, small stones, shells, &c., cemented together by the secretions of the animal, and lined with silk; this protects the larvæ, which can put out or draw in the head as occasion requires. They drag the case along with them, whether crawling, swimming, or at the surface; they load one side to keep it down with great dexterity. The half-banded caddis fly (*neuronia fuscata*, Say) is about an inch long, of a tawny color, with an expanse of wings of more than 1½ inch.

CADDO, a N. W. parish of Louisiana, bounded N. by Arkansas, E. by Red river and the great raft, and W. by Texas; area, 1,200 sq. m.; pop. in 1870, 21,714, of whom 15,799 were colored. During eight months of the year the Red river is navigable as far as Shreveport. The surface of the parish is undulating, and is partly occupied by Soda and Caddo lakes, which communicate with Red river and with each other, and are navigable by steamboats. The

Southern Pacific railroad passes through the parish W. of Shreveport, and the North Louisiana and Texas railroad will connect that place with Vicksburg. The productions in 1870 were 384,824 bushels of Indian corn, 56,705 of sweet potatoes, and 26,887 bales of cotton. There were 844 horses, 3,579 mules and asses, 2,178 milch cows, 7,434 other cattle, 2,157 sheep, and 6,886 swine. Capital, Shreveport.

CADDOES, or *Caddaquies*, a tribe of Indians on one of the branches of the Red river. They were first visited in 1687 by Jontel and the other survivors of La Salle's fated Texas colony. Spanish writers made them part of the confederacy known as the Texas. About 1822 they numbered 600, and were on Lake Caddo; they are now in the Indian territory, on the Wichita river, and in 1869 numbered 284. They have become closely connected with the Wichitas, and are represented as peaceable and industrious.

CADE, John, known as Jack Cade, an English insurgent, born in Ireland, died July 11, 1450. He assumed the name of Mortimer, pretending to be a cousin of the dispossessed heir to the throne, the duke of York, and placed himself at the head of a body of insurgents, which soon became 20,000 strong. From Blackheath, near London, he addressed a document to Henry VI. in which he set forth the grievances for which his followers asked redress, and another containing a demand for the banishment of certain persons. The king having sent an army against him, Cade retreated to Seven Oaks, and then turned upon the king's army, which he completely routed, June 27, 1450, and on July 1 took possession of Southwark. He crossed the Thames by the drawbridge, July 3, and entered London, but at night took his men back to Southwark. They reentered London on the 4th, and beheaded Lord Say, the treasurer, and Cromer his son-in-law, sheriff of Kent. The insurgents having committed some pillage, the citizens resisted their coming into London again the next morning, and kept possession of the bridge against them. A truce being declared, the bishop of Winchester took advantage of it, and distributed pardons under the great seal for those of the insurgents who should return home. Most of them dispersed, and soon afterward Cade himself fled, but was overtaken in Sussex and killed.

CADELL, Robert, a Scottish bookseller, died in Edinburgh, Jan. 20, 1849. He undertook the publication of Sir Walter Scott's works after the failure of Constable and Ballantyne. His enterprise aided Scott materially in his effort to pay the debts for which he was liable upon the failure of Constable, amounting to nearly £150,000. Scott paid all except about £30,000, which was advanced by Cadell after Scott's death, on the security of his copyrights, and the outstanding debts were paid in full.

CADES, Giuseppe, an Italian painter, born at Rome in 1750, died there in 1800. He acquired such skill in copying the works of the

old masters that his imitations could hardly be distinguished from the originals; but he never produced any notable works of his own.

CADET DE VAUX, Antoine Alexis François, a French chemist, born in Paris, Sept. 13, 1748, died at Nogent-les-Vierges, June 29, 1828. Originally an apothecary, he devoted himself to the study of chemistry as applied to everyday life. He invented the galactometer, introduced a new mode of disinfection, secured the prohibition of the use of copper measures by tradesmen, procured the suppression of the *cimetière des innocents*, and introduced agricultural fairs into France. In 1772 he opened a school for instruction in bread making, and in 1777 founded the *Journal de Paris*. He published several works on rural and household economy.

CADI (Arab. *kadi*, from *kadai*, to judge), a magistrate in Mohammedan countries. In those countries, law and religion being both founded upon the Koran, the clergy and the officers of the law form a single order. In Turkey any Ottoman may enter this order by passing a prescribed examination, whereupon he receives the title of *imam*. Those who propose to devote themselves to the law pursue a further course of study, and are then qualified for the office of *cadi*. The *cadi* has the powers of a judge of courts of ordinary civil and criminal jurisdiction, and those of surrogate and notary public. Properly, the *cadi* is a magistrate in a village or town, the superior judge of a city or province being styled a *mollah*.

CADILLAC, Antoine de la Mothe, a French explorer, born in Gascony, died about 1719. After being a captain in the marine service he came to Acadia (now Nova Scotia), and in 1691 obtained a grant of Mount Desert island, Maine. He commanded at Michilimackinac from 1691 to 1697, founded Detroit in 1701, and commanded there for several years, often involved in troubles caused by his rashness and prejudices. He was governor of Louisiana from 1712 to 1717, and endeavored to work silver mines, and to open trade with Mexico, but failed. He established forts among the Alibamons and Nachitoches, and by his unwise conduct created the first troubles with the Natchez. In 1787 his descendants recovered some of his lands in Maine.

CADIZ. I. A S. province of Spain, being the part of Andalusia bounded N. by Seville, E. by

Malaga and the Mediterranean, S. by the straits of Gibraltar and the Atlantic, and W. by the Atlantic and the Guadalquivir, which separates it from Huelva; area, 2,806 sq. m.; pop. in 1867, 417,346. It is hilly and mountainous, being traversed by the Sierra Nevada. Only a part is under cultivation. About 24,000 acres are vineyards, and the finest wines of Spain are produced near Jerez. The principal rivers are the Guadalquivir, the Salado, and the Guadalete. The railway from Seville to Cadiz traverses the western part of the province. The principal towns are Cadiz, Puerto de Santa Maria, San Lucar de Barameda, Jerez de la Frontera, Arcos de la Frontera, and Algeciras. II. The capital of the province, situated upon a promontory which extends N. W. into the Atlantic from the Isla de Leon, in lat. 36° 31' N., lon. 6° 17' W., 310 m. S. W. of Madrid; pop. about 72,000. The Isla de Leon is separated from the mainland by a narrow channel, the Rio de Santi Petri, at the entrance of which from the ocean is the fort of Santi Petri. On the right of the railway from Seville as it approaches the city are the forts of San Luis, Puntales, and Matagorda. The railway passes over a low and narrow isthmus to the rocky point on which the city is built. On the opposite side of the bay enclosed by this isthmus and point are Puerto de Santa Maria, at the mouth of the Guadalete, and the fort of Santa Catalina. The city is surrounded by walls, and is one of the most strongly fortified places in Spain. The lighthouse of San Sebastian, on the W. or ocean side, is 172 ft. high from its base, and may be seen 20 m. out at sea. On the east, outside of the ramparts, is the principal promenade, the



The Alameda at Cadiz.

Alameda. The city has a clean appearance on account of the white stone used in building. Many of the houses are surmounted by observatories called *miradores*. The streets

are narrow, but regularly laid out; the finest is the calle Ancha, which contains the *bolsa*, or exchange, and is connected with the principal square, the plaza San Antonio. The city is divided into four quarters, containing 6 great and 23 smaller squares, and 260 streets. It has 2 cathedrals, 7 churches, 18 convents, 2 theatres, and a bull ring. There are some fine paintings in the city. Murillo fell from the scaffold while painting a picture which is in the convent of San Francisco, and died from the effects of the fall. The *casa de misericordia* is a large hospital, and there are other charitable institutions. There are also a custom house, colleges, a drawing academy, and an observatory. The climate of the city is hot, and it is at times rendered uncomfortable by the winds from Africa. The manufactures are not of much importance, but fans, mantillas, gloves, guitars, and sweetmeats are made. Its chief importance is commercial. The harbor is excellent, although changes produced by the action of the river Guadalete and other causes tend to obstruct its entrance. Upon the discovery of America Cadiz attained great commercial importance. It was the port from which the trade with the Spanish colonies was carried on; but when these colonies became independent Cadiz lost much of its commerce. Its position, however, at the entrance of the Mediterranean and at the southern end of the peninsula renders it still commercially the most important port of Spain. Its business has been increased by the opening of the railway from Seville, and by improvements which have been made in the harbor. Merchandise destined for Seville is commonly unloaded here. The principal articles of import are sugar, coffee, cocoa, spices, indigo, rice, wheat, salt fish, butter, cheese, hides, cotton, wool, linen, iron, brass, glass, and earthenware. Among the exports are fruits, brandy, barilla, cork, lead, quicksilver, raw silk, paper, silk and woollen manufactures, and lace. Wine is, however, the main article of export; the value shipped from Cadiz and the other ports around the bay in 1864 was \$6,300,000. Cadiz is the starting point for Spanish mail steamers for the colonies in America, Africa, and the East; there are also lines of steamers to England, Gibraltar, Lisbon, Marseilles, Havre, Amsterdam, and Hamburg. —Cadiz was founded about 1100 B. C. by the Phœnicians, who called it Gadir. Before the second Punic war it belonged to the Carthaginians, but in 206 B. C. surrendered to the Romans, who changed the name to Gades. The remains of a temple of the Phœnician Hercules, and some other edifices of the ancient city, are still visible at low water. It fell into the hands of the Goths, from whom it was taken in 711 by the Arabs, who held it till 1262, when it was taken by the Spaniards. It was long known by the name of Cales to the English, by whom it was taken and sacked in 1596; the booty was immense; 18 ships of

war and 40 huge treasure galleons were destroyed, causing almost universal bankruptcy in Spain. It was unsuccessfully attacked by the English in 1625, was blockaded by Admiral Blake in 1657, and was again unsuccessfully attacked by the English in 1702. From 1810 to 1812, when it was the seat of the central national junta, it was invested by the French, who raised the siege upon the approach of Wellington. In 1823 it surrendered to the duke of Angoulême, after a siege, which was the closing operation of the French intervention in favor of Ferdinand VII. It has since been conspicuous for its liberalism in several crises of Spanish affairs. The first movement in the revolution which overthrew the throne of Queen Isabella took place at Cadiz, Sept. 17, 1868.

CADMEA (Gr. *καδμεια*), a name applied by the Greeks to zinc ore, in honor of Cadmus, who first introduced the manufacture of brass into Greece. The same term is also applied to the impure oxide of zinc found in chimney stacks in the metallurgical working of ores containing traces of zinc. The zinc ore is now called calamine.

CADMIUM. In 1818 the attention of chemists was called to some samples of zinc that were sold for medicinal purposes; they gave, when in solution, a suspiciously yellow color with sulphuretted hydrogen, and hence were condemned as containing arsenic. A number of chemists were furnished with specimens for examination, and several of them detected evidences of a new metal at the same time. Friedrich Stromeyer, professor of chemistry at Göttingen, was the first to publish, in September, 1818, a full account of his investigations into the properties of the substance. He gave to the new metal the name of cadmium. Karsten simultaneously proposed to call it *melinium*, from the quince-yellow color of one of its compounds; Gilbert gave it the name of *Junonium*, from the planet Juno; and John christened it *Klaprothium*, after the chemist Klaproth; but cadmium is the only name now recognized. The discovery of cadmium forms an era in the line of scientific research. It was the first metal found in a compound and not in an ore, and it could not have been detected until chemical analysis had reached an advanced state of accuracy. Traces of it were soon found in zinc ores, but it was not till 20 years from the time of Stromeyer's publication that an ore of cadmium was discovered. Lord Greenock at that time described a mineral which had been picked up on his estate, and which proved to be a cadmium blende, analogous to zinc blende or to galena. The new ore was called Greenockite, and since that time it has been found in various localities; it is, however, a very rare mineral.—For commercial purposes, the metal is obtained from zinc ores and furnace deposits. By subjecting zinc to downward distillation, the first portions that come over often contain cadmium. The pure metal is ob-

tained by dissolving the regulus in sulphuric acid, and converting it into a sulphide, by means of sulphuretted hydrogen; then redissolving and reprecipitating by carbonate of ammonia, and reducing with a proper flux. As thus obtained, it is a white, soft, malleable, ductile metal. It leaves a mark upon paper the same as lead, and when bent gives out a creaking sound similar to that known as the "tin cry." It can be distilled the same as zinc; but unlike zinc, when it is set on fire and burns, it gives a brown oxide. It sometimes happens that zinc white is contaminated by this brown powder and rendered worthless as a paint. Cadmium has a specific gravity of 8.6; fuses at 315° C. (600° F.); and boils at 860° C. ($1,580^{\circ}$ F.). Specific gravity of its gas, 3.9, or 56 times heavier than hydrogen.—When alloyed with other metals, cadmium causes them to fuse at a lower temperature; a very little of it renders copper perfectly brittle. A composition of 78 parts of cadmium and 22 of mercury was for a long time used for plugging teeth; but, as the amalgam oxidizes easily and turns yellow, and the mercury proves injurious to health, this application is nearly abandoned. Mr. Abel has proposed an alloy for jewellers' use, which is said to be very malleable and ductile, and to possess a fine color. It is composed of 750 parts of gold, 166 of silver, and 84 of cadmium. Wood's alloy, which fuses at 158° F., is composed of 2 parts of cadmium, 2 of tin, 4 of lead, and 8 of bismuth. It is as a yellow paint that cadmium compounds are most highly prized. By mixing a solution of gum arabic, chloride of cadmium, and hyposulphite of soda together, we obtain a fine yellow paint, which is one of the most durable known to artists. There are other modes of making it, and the purity of color depends very much upon the absence of metals that turn black when mixed with sulphur, and upon the care with which it is dried. The very property that led to the condemnation of zinc white, and which ultimately brought about the discovery of cadmium, is the yellow color, now most frequently turned to valuable account. The keeping properties of the colloidion, made sensitive by the iodide and bromide of cadmium, have made these salts great favorites with photographers, and a new use for cadmium has sprung up of late years in this direction. Manufacturers are becoming accustomed to save the furnace and flue dust of zinc works, and separate the cadmium from them, and in this way the supply of the metal is increasing. The following mixture burns with a brilliant white flame, surrounded by a magnificent blue border: saltpetre, 20 parts; sulphur, 5; sulphide of cadmium, 4; lamp-black, 1. This can be moistened, and made up into balls or candles, and ignited after the manner of a fuse.—The salts of cadmium are in general soluble and take crystallized forms. They have no color, but possess a nauseous taste and act as emetics. The sulphate is ob-

tained by dissolving the carbonate or the metal itself in dilute sulphuric acid, a little nitric acid being added. It is a salt of similar properties to those of sulphate of zinc, but much more powerful. It is used in medicine in the treatment of syphilis, rheumatism, and gout; in diseases of the eyes as an astringent and stimulant, and for the removal of specks and opacities of the cornea. There seems to be still some doubt as to the proper dose for internal use, since some authorities state that it is about equal in power to sulphate of zinc, while others estimate it as being ten times more active.

CADMUS, a mythical king of Thebes, son of Agenor, king of Phœnicia, and brother of Europa, who is said to have introduced into Hellas the 16 simple letters of the Greek alphabet. He left his native country in search of his sister Europa, who had been borne off by Jupiter. On making inquiry of the Delphic oracle as to what state he should choose for settlement, he was advised to follow a heifer which would meet him. Cadmus found her in Phocis and followed her into Boeotia, where she sank down on a spot which Cadmus called Cadmea, and which became the citadel of Thebes. He sent some of his company to draw water from a well sacred to Mars. This well was guarded by a dragon, which slew the intruders. Cadmus slew the dragon, and was directed by Minerva to sow the monster's teeth. He did so, and a host of armed men immediately sprang from the ground, who were called the *Sparti*, or the Sown. These were about to turn upon Cadmus, but the latter threw a stone amid them, and a fight ensued which did not cease until all were slain except five. These survivors became tractable and helped Cadmus to build a new city. Cadmus was honored as the founder and patron of Thebes. To recompense him for his perils the gods gave him Harmonia, the daughter of Mars and Venus, for a wife, and honored their nuptials with their presence and with gifts. Cadmus subsequently became king of the Enchelians, fought the Illyrians, and had a son called Illyrius; and finally he and Harmonia were changed into serpents and removed to Elysium.

CADOUDAL, Georges, the leader of the Chouans or Breton insurgents in the French revolution, born at Kerléano, in lower Brittany, Jan. 1. 1771, guillotined in Paris, June 25, 1804. He was educated at the college of Vannes, and at first shared in the reformatory hopes which the revolution inspired; but the attempts of the assembly against the church set him in opposition to all the new ideas. With 50 of his compatriots he joined in 1798 the Vendean chiefs at Fougères. He was soon arrested and thrown into prison, but escaped in the disguise of a sailor, and became formidable at the head of an army of Chouans. After the disaster of Quiberon, he united the remains of the royalist troops, but was unable to make progress against the republican army under Hoche. By his efforts the insurrection was renewed in

1799, but without success, and he was obliged to flee to England. He was received with distinction by the English government, and by the count of Artois, who made him lieutenant general. In 1803 he returned to Paris, with several other officers, with the design of overthrowing the government. His plot was revealed, and all the efforts of the police were immediately directed to his discovery. Pichegru, his principal associate, was betrayed by a friend, and was a few days later found dead in his cell. Cadoudal was arrested in March, 1804, attempting to leave Paris in a covered carriage, first, however, shooting two of the police, and shortly after was adjudged guilty of an attempt upon the life of the first consul. He showed great courage to the last, avowing himself to be the head of the conspiracy, and avoiding most carefully to compromise any of his partisans.

CADWALADER, John, an American soldier, born in Philadelphia in 1743, died Feb. 10, 1786. He was a member of the Pennsylvania convention in 1775; and at the commencement of the war was commander of a volunteer company, nearly all the members of which subsequently became officers in the army. In 1777 he was appointed by congress a brigadier general, and took part in the battles of Princeton, Brandywine, Germantown, and Monmouth. He commanded one division of the army in the attack upon Trenton, but was prevented by the ice from crossing the river in season to engage in anything but the pursuit of the defeated enemy. He fought a duel with Gen. Conway on account of his intrigues against Gen. Washington, and was after the war a member of the assembly of Maryland.

CÆCILIANS, or *Apoda*, an order of batrachians, with a long snake-like body, destitute of limbs, and with very minute eyes. They live in the tropical marshes of the old and new world, and attain a length of 1 to 3 feet. Their movements are snake-like.

CÆCILIUS STATIUS, a Roman comic poet, contemporary of Ennius, and the immediate predecessor of Terence, died in 168 B. C. Of his works there remain only a few fragments, and the titles of 40 of his dramas, which indicate that his plays were adaptations from the works of Greek writers of the new comedy. He was highly esteemed by the Romans, who placed him, with Plautus and Terence, in the first rank of comic poets.

CÆCUM (Lat. *cæcus*, blind), the rounded or sac-like commencement of the large intestine. The small intestine opens into the large intestine nearly at right angles, and at a distance of 2½ inches from the commencement of the latter. This portion of the large intestine, included between its commencement and the opening of the small intestine, is called the cæcum, or, in popular language, the blind gut, from its closed and rounded extremity. It is also called the *caput colæ*, or head of the colon. It is the most capacious portion of the large intestine,

its width being about equal to its length. It is situated in the right iliac region (see **ABDOMEN**), where it is retained in position by a fold of peritoneum and an attachment of loose cellular tissue. From its rounded extremity it sends off a narrow tubular prolongation, four or five inches in length, called the vermiform appendix, which is curled spirally in several turns, and is also retained in position by a peritoneal attachment. The specific functions performed by the cæcum, as distinguished from the remainder of the large intestine, are not clearly understood. It is sometimes the abode of a minute parasite, the *trichocephalus dispar*, which is rarely found in any other location.

CÆDMON, the first Anglo-Saxon poet, died A. D. 680. According to tradition, he was a swineherd to the monks of Whitby, and one night a vision appeared to him and commanded him to sing. When he awoke, the words of a poem in praise of the Creator were impressed upon his memory. He was admitted into the monastery at Whitby, where he continued to compose devotional poems. His paraphrase of parts of the Scriptures was printed at Amsterdam in 1655, edited by Junius. Thorpe published an edition of it (London, 1832) for the society of antiquaries. It has been said that Milton took some ideas of "Paradise Lost" from the poems of Cædmon. They were very popular, and furnished plentiful materials to the makers of mysteries and miracle plays. The only manuscript of the paraphrase extant is to be found in the Bodleian library at Oxford.

CÆLIUS AURELIANUS, a Latin physician, a native of Numidia, who flourished during the decline of the Roman empire. He was a member of the sect of the Methodici, and the author of a medical work still highly esteemed. He divides diseases into two great classes, the acute and the chronic, to the former of which classes he devotes his first three books, and to the latter the remaining seven.

CÆLIUS MONS. See **ROME**.

CAEN, a town of Normandy, France, capital of the department of Calvados, upon the river Orne, 10 m. from its mouth, and 120 m. W. N. W. of Paris; pop. in 1866, 41,564. It is on the line of the Paris and Cherbourg railway, at its junction with a railway from the south. The Odon falls into the Orne at the city, and a basin is formed which is connected by a ship canal with the ocean, so that vessels of 200 tons are enabled to reach Caen. Its streets are broad and straight. William the Conqueror built here a large church, known as the *abbaye aux hommes*, now the church of St. Etienne, where he was buried; while his queen, Matilda, was the founder of another church, the *abbaye aux femmes*, now the church of Saint Trinité, whose elegant architecture contrasts with the austere severity of the former. The church of St. Pierre is remarkable for the beauty of its spire; and there are several other fine churches. The finest promenades are the Grand Cours

along the Orne, the Petit Cours, and the Cours Caffarelli. The hôtel de Valois, built in 1588 for Nicolas Le Valois, is now the exchange. The prefecture, the theatre, the hall of the university, and the hôtel de ville are fine buildings. In the hôtel de ville is a public library of more than 50,000 volumes. The museum contains a fine collection of paintings. The principal manufacture, that of lace, employs 20,000 women and children. There are four ship yards, and cut stone, quarried in the neighborhood, is exported in large quantities.—Caen was strongly fortified by the dukes of Normandy, but of these fortifications one tower and a castle are all that remain. It was taken in 1346 by Edward III. just before the battle of Crécy; and again by the English in 1417, who held it till 1450. It suffered during the civil and religious wars of the 16th century; it was pillaged by the Huguenots in 1562, and deprived by the revocation of the edict of Nantes, in



Apsis of Church of St. Pierre.

1685, of most of its skilled artisans. After June 2, 1798, it was the headquarters of the Girondists. Here, in the same lunatic hospital, died Beau Brummel and Bourrienne, the secretary of Napoleon.

CAERLEON, a market town of Monmouthshire, England, on the Usk, 3 m. N. E. of Newport; pop. in 1871, 1,268. The parish church (St. Cadoc's) has a tower of the early English style. There is a handsome stone bridge over the Usk, and iron and tin works in the neighborhood. It was a Roman station (*Ica Silurum*), and a Roman road, *via Julia*, passed through it. It is believed to have been the capital of Britannia Secunda (Wales), and the seat of a bishopric soon after the introduction of Christianity into Britain. It was the seat of the mythic court of King Arthur, and a space

of ground, 222 by 192 ft. has received the name of Arthur's Round Table; but it was probably a Roman amphitheatre. In the 12th



Arthur's Round Table.

century it was noted as a seat of learning, and contained an abbey of Cistercian monks. Many objects of antiquity, chiefly Roman, have been found in the vicinity, which are preserved in the museum of the town.

CAERMARTHEN. See **CARMARTHEN**.

CAERNARVON. See **CARNARVON**.

CÆSALPINUS, **ANDREAS** (**ANDREA CÆSALPINO**), an Italian physician and naturalist, born at Arezzo in 1519, died in Rome, Feb. 23, 1603. He was for a time professor of botany in the university of Pisa, and was afterward called to Rome by Clement VIII. to be chief physician to the pope and professor of medicine in the Sapienza college, which positions he retained till his death. He published works upon botany, mineralogy, medicine, and the highest questions of philosophy. His philosophical speculations are contained mainly in his *Questiones Peripateticæ*. In his first publication, *Speculum Artis Medicæ Hippocraticæ*, he showed his knowledge of the system of the circulation of the blood. The following passage is from the second chapter of its first book: "For in animals we see that the nutriment is carried through the veins to the heart as to a laboratory, and its last perfection being there attained, it is driven by the spirit which is begotten in the heart through the arteries and distributed to the whole body." The system accepted since the time of Harvey could hardly be more definitely or accurately stated. He was styled by Linnæus the first orthodox or systematic botanist, and his work on plants was a handbook to Linnæus in all his classifications. Botany in the time of Cæsalpinus was the popular witchcraft; as a science, it consisted in a mass of erudition about the marvellous but imaginary virtues of plants. Cæsalpinus sought successfully to transfer it from the realm of magic to that of science. He proposed the basis of classification upon which the whole system of Linnæus rests, namely, the distinction of plants in their parts of fructification, and defined many classes and orders as they remain in the Linnæan arrangement.

CÆSAR, Gaius Julius, a Roman general and statesman, born, according to authorities long universally credited, July 12, 100 B. C., but, according to the almost unanswerable proof recently advanced by Mommsen, exactly two years earlier, assassinated in the senate house on the ides (15th) of March, 44 B. C. The month of his birth, previously called Quintilis, was from his name called Julius, from which comes our July. His father, of the same name, was of prætorian rank, and his mother belonged to the family of Aurelius Cotta. From the earliest age he gave evidence of the most extraordinary endowments. He was quick to learn, of wonderful memory, the liveliest imagination, and indefatigable diligence. In his 17th year, having been married to one Cossutia, he procured a divorce in order to marry Cornelia, a daughter of Cinna, then a leader of the democratic party. His aunt Julia had previously married Marius, the foremost democratic chief; and thus by a double connection Cæsar was brought upon the popular side. Sulla sought to detach him from this party by persuading him to repudiate his wife, but Cæsar refused. Sulla, angry at this, stripped him of his wife's dowry, of the fortune he had inherited, and of the office of *flamen dialis* (priest of Jupiter) which he held. Cæsar even deemed it necessary to quit Rome, and escaping the satellites of Sulla, who tracked him in his flight, he took refuge with Nicomedes, king of Bithynia. Minucius Thermus was then prætor in Asia, and appointed Cæsar to conduct the siege of Mytilene, which he did with remarkable energy and success. The death of Sulla allowed him to return to Rome, where he indicted Dolabella for extortion in Macedonia (77); but the senate saved its partisan. The credit he gained as an orator in the case of Dolabella suggested to him the design of cultivating eloquence, for which purpose he set out for Rhodes, to receive the instructions of Molo, who a year or two before was Cicero's teacher. On the way thither he was captured by a band of Cilician pirates, who detained him 38 days. They asked a ransom of 80 talents (over \$30,000), which he laughed at, saying that if they knew who he was they would demand 50. He consented to pay it, but told them that if he ever caught them afterward he would crucify them all. Arrived at the island of Delos, he was set on shore, and paid the ransom; but he immediately organized a small fleet, sailed in pursuit of the pirates, came up with and captured them, and taking them to land reported their case to the Roman proconsul. While that magistrate was considering what was to be done, Cæsar remembered his threat, and executed the whole gang. In 74, hearing that he had been chosen one of the pontifices, he returned to Rome, and for a while led a life of pleasure, some say of gross debauchery, winning the good opinion of the people by his affable manners and careless generosity. In 73 he was chosen a military

tribune, and in 68 a quæstor, in which office he delivered a panegyric on his aunt Julia, the wife of Marius; and he also caused the bust of Marius to be carried in procession, for the first time since the dictatorship of Sulla. While he was quæstor he also served in Spain, distinguishing himself by his military capacity. In 65 he was elected ædile, and this office, being connected with the public entertainments, gave him an opportunity to display his taste for magnificence. He raised again the trophies of victory, which, erected in the capital by Marius, had been thrown down by Sulla's order; and he enlarged the theatres, and gave splendid games and festivals. He came out of the ædileship several millions of dollars in debt. In 63 the conspiracy of Catiline was discovered, and Cæsar was suspected of complicity in it; but when the matter came up in the senate some time later, he succeeded, to the satisfaction of his auditors, though not of historians, in disproving the story. He defended the conspirators, however, from the punishment of death, holding that it would be wiser to scatter them and keep them under strict guard. In the same year he aspired to the place of pontifex maximus, one of considerable influence and emolument. Catulus, an opposing candidate, offered to pay his debts if he would withdraw, but Cæsar replied that he would borrow more money than that if it were necessary to his success. On the day of election he remarked to his mother that this day would see him either the chief priest of Rome or a dead man. He was elected, getting more votes from the tribes of his opponents than they did themselves. The next year (62) he became prætor, and on laying down that office was transferred, as was the custom, to the government of a province. He selected Spain; but before he departed his creditors arrested him, and his friend Crassus had to become his security to the amount of nearly \$5,000,000. He achieved not a little military success in Spain in a cruel war against the native tribes, and then hurried back to run for the consulship. He was chosen, and administered the government with unexampled vigor (59). His colleague, Bibulus, attempted in the outset to check him in his objects, but in a short time was completely outmanaged, and when he attempted to resist Cæsar's measures was carried from the forum by the lictors at Cæsar's order. He limited the powers of the senate, often even disregarding their constitutional decrees; procured the passage of a law for the distribution of lands among the poorer classes; gained the favor of the equestrian order by releasing it from an oppressive contract; and made himself a great favorite with the people. At the same time he strengthened the political coalition made the preceding year with Pompey and Crassus, and known as the first triumvirate. At the close of his term he was given the government of Cisalpine Gaul, with Illyricum, for five years; and the senate, the more effectually to

get him out of the way, added Transalpine Gaul (France) to the charge (59). The next year he arrived in his province, where he was now to engage in a labor which would test his military talents. The Romans were asked to settle the disputes of the Gallic tribes, warring among each other for the ascendancy, and also to help them repulse the Suevi, who were beginning to invade and oppress the country. Cæsar defeated the German army under Ariovistus, between Vesontio (Besançon) and the Rhine, in 58, and drove the remnant across the Rhine; in 57 he marched against, and in that and the succeeding year fully subjugated the Belgic tribes, winning a series of remarkable victories; in the summer of 55 he made his first expedition to Britain, and the next spring undertook a partially successful invasion of the island; in 53, his government having been extended for five years more, he suppressed a formidable insurrection among the conquered continental tribes; and on the breaking out of a second and wide-spread revolt, he finally determined on the complete and lasting subjection of the whole of Gaul, nearly all of which, including the greater part of the former allies of the Romans, was now arrayed against him. After a long succession of violent conflicts, and displays of the most brilliant generalship, he saw all the region west of the Rhine (which river he crossed twice) and north of the Pyrenees made subject to Rome, and his design accomplished. —In the mean time political intrigues had been constantly agitating Rome, and now, at the close of his victorious campaigns, Pompey, his rival (though lately his son-in-law, having in 59 married his daughter Julia, who died in 54), procured a law recalling Cæsar, who refused to obey, and was threatened with being declared the enemy of the republic. The tribunes of the people refused to confirm the decrees, when the senate, treating their veto with contempt, outlawed Cæsar, and directed the consuls to "see to it that the republic should suffer no harm." The tribunes repaired to Cæsar, who had now by means of their accession got the law on his side, and he immediately (January, 49) passed the Rubicon, a small stream separating his province from the territories of the republic, in order to march upon Rome. This act was equivalent to a declaration of war against the senate, who prepared for defence. Pompey acted as their commander-in-chief, but the popular feeling soon manifested itself so decidedly in favor of Cæsar, that the senatorial party fled to Greece. Cæsar pursued them thither, and then for years a war raged which led Cæsar into Spain, and all over Italy; into Thessaly, where the great battle of Pharsalia or Pharsalus (Aug. 9, 48) decided for him against Pompey; to Egypt, where he wept at the sight of the head of his great rival, treacherously killed there, and where he decided in favor of the Egyptian woman the dispute for the throne between the last Ptolemy and Cleopatra; into Pontus, against Phar-

naces, son of Mithridates, where he conquered with such ease that he could announce *Veni, vidi, vici*; into the province of Africa, where he defeated M. Scipio, but could not conquer Cato, who at Utica preferred death to life under the rule of a single man. The result of these victories was that Cæsar gained supreme power in the Roman state, and in 46 was proclaimed dictator for ten years, from the 1st of January. 45. With consummate statesmanship he set to work reorganizing the nation, though perpetually interrupted by the remains of the senatorial party. The sons of Pompey rose against him in Spain, which compelled him to go thither and crush them (at Munda, 45). On his return he was hailed as *imperator*, and invested with sovereign powers; the appellation of *pater patriæ*, "the father of his country," was voted him; the coins were stamped with his image; and he was allowed to wear at all times a crown of laurel on his head. This excess of subservience on the part of the multitude won and deluded



First Brass Coin of Julius Cæsar.

by his triumphs, and his kingly show and liberality, rekindled the jealousy of the aristocratic faction, and disgusted all the more moderate. But the gross flattery of the new senate carried matters to a still higher pitch of adulation. They ordered the statues of Cæsar to be borne in the processions along with those of the gods; they dedicated temples and altars to him, and appointed priests to superintend his worship. A story became current that he aspired to the name of king and to royal power; and though he had ostentatiously refused a crown tendered him in public by Mark Antony, this report gained such credit that a number of young patricians availed themselves of the Roman aversion to a monarchical title as a cloak to a design for Cæsar's assassination. Caius Cassius was the ostensible leader of this conspiracy, assisted by Brutus, whom Cæsar had greatly benefited, but who was persuaded to sacrifice his benefactor, as his ancestor sacrificed his sons, to the republic. Cæsar was absorbed in his reforms of the government, and in the endeavor to consolidate the public order, to which end he had projected and partly executed several vital measures. While he was thus engaged the conspirators, about 60 in all, perfected their plans. Though warned by a soothsayer, and, according to the Roman account, met by the most unfavorable omens, Cæsar was not to be dissuaded from his regular attention to the public business, and visited the senate house as usual on the ides of March, the day of which the fortune-teller had instructed him to beware. On his way a writ-

ten account of the conspiracy was put into his hand, but he thrust it unopened into the bosom of his mantle. It was agreed by the conspirators that one of them, Lucius Tillius Cimber, should present a petition to him, and that his expected refusal to grant it should be the signal for his murder. All happened as it had been planned; the assassins rushed upon him with their daggers, and met with but a momentary resistance; wrapped in his toga, he sank, pierced with 23 wounds, at the foot of the statue of Pompey; and Rome was again plunged into civil war, and became a prey to Antony and Octavius, the grandson of Cæsar's sister Julia. The heads of the conspiracy, Brutus and Cassius, perished at Philippi in 42, and when Octavius had vanquished Antonius, Cæsar's son by Cleopatra, Cæsarion, was put to death by his order. Cæsar's last wife, Calpurnia, survived him.—As a general Cæsar stands in history among the first, having no equal except perhaps the modern Napoleon; as a statesman the highest rank is conceded to him; as an orator he was compared to Cicero; and as a writer he surpassed Xenophon, and was only less than Tacitus. Besides his masterly "Commentaries," the memoirs of his own career, he wrote on grammar and on rhetoric; composed tragedies, satires, and lyrics; and reformed the calendar as well as the state. (See CALENDAR.) His moral sensibility appears to have been unequal to his intellectual acuteness or to his force of will; and the record of his life is stained by acts of profligacy, and by a needless waste of human life. In person, Cæsar was tall and spare; his face was generally pale, his body weak and subject to epileptic fits. He was fastidious in his tastes, amiable and courteous, careful of the feelings of his friends, and generous to his enemies, except when he deemed them incorrigible. His great works are the *Commentarii de Bello Gallico* and *Commentarii de Bello Civili*. The first is in seven books, containing the incidents of as many campaigns; an eighth book was afterward added by another hand; it contains an account of his actions while in Gaul, during which time he invaded Britain and Germany. The second work describes his contest with Pompey until the time of the siege of Alexandria. It is not known when he published the first, but it was probably about 51 B. C.; the second was published in 47 B. C. Both these works were written immediately after the events occurred, and are therefore most important as authorities. His style is noted for its simplicity, naturalness, and purity, for which qualities nothing in the Latin language can be compared to it. Cæsar's veracity has been called in question by Asinius Pollio (Suetonius, 56), and by several later writers. Schneider, in particular, advances the opinion that the object of his first work was political, to give the public a favorable idea of his talents, and to confound the plans of his enemies who were attempting to destroy his popularity; and that

of the second to appease the animosity of the partisans of Pompey. This opinion has been very ingeniously maintained, but there is the greatest difficulty in reconciling it with the simplicity of Cæsar's style. Cæsar is mentioned in terms of unqualified praise by Cicero in his *Brutus*. Tacitus, in his *Germania*, calls him *summus auctorum dicitur Julius*. The genuineness of the Commentaries has also been questioned. Julius Celsus, at Constantinople, published an abstract of Cæsar's Commentaries, from which arose the report that he was the original author; it is without foundation, and there is a previous Greek translation of Cæsar by Planudes. Many think, and with reason, that Cæsar wrote a diary; Servius has a passage which is not in our copies, under the title of *Ephemeris*; and Plutarch has one under the same title which has come down to us, showing that something of the kind was written by him. He left some orations, letters, apophthegms, a treatise *De Analogia, Anticato*, &c., all of which are lost, except the letters which are preserved in the works of Cicero. The supposed author of the eighth book, and also of the additions to the civil war, is Aulus Hirtius, a legate of Cæsar, who died one year after him at Mutina (now Modena), where both the consuls Hirtius and Pansa were slain. It has been thought that Hirtius wrote the *Bellum Hispanicum*, but the style shows it to be the work of a different hand. The *editio princeps* of Cæsar's works was published at Rome in 1469; good editions are those of Oudendorp (Stuttgart, 1822) and Herzog (Leipsic, 1881-4).—The ancient authorities for the life of Cæsar are the biographies by Suetonius and Plutarch, the letters and orations of Cicero, and the histories of Dion Cassius, Appian, and Velleius Paterculus. A life of Cæsar was begun by Napoleon III., and two volumes were published (*L'Histoire de Jules César*, Paris, 1865-6). But perhaps the best modern account of his career is that given by Mommsen, who, in his "History of Rome," has devoted a very large space to this subject.

CÆSAR, Sir **JULIUS**, an English jurist, of Italian descent, son of a physician to Queens Mary and Elizabeth, born at Tottenham in 1557, died April 28, 1636. After having held high offices during the reign of Queen Elizabeth, he was appointed by James I. chancellor of the exchequer. This office he resigned upon receiving that of master of the rolls, which he retained till his death. He was a strong friend of Bacon, whom he assisted during his trial, and who died in his arms. Williams, Bacon's successor, having himself had no experience in chancery practice, relied greatly upon Sir Julius's learning and skill. He was remarkable for the gravity of his character, and his reputation for benevolence was so great that his house was as well known to poor people as a hospital. His life was published by Edmund Lodge (royal 4to, London, 1810).

CÆSAREA (now *Kaisariyeh*). I. An ancient city of Judea, on the Mediterranean, 55 m. N. N. W. of Jerusalem. It was founded by Herod the Great, upon the site of a town called *Turris Stratonis*. He formed its harbor by the construction of a curved mole 200 ft. in length, built of blocks of stone 50 ft. long and 18 wide, which was one of the greatest works of antiquity. The city was built around

the harbor, and was adorned with a temple to Augustus Cæsar, after whom it was named, with a theatre, circus, and many other splendid edifices. It became the seat of the Roman procurators and of the titular kings of Judea. In this city Peter preached, Paul was imprisoned, and James was put to death. Eusebius the historian was bishop of Cæsarea. The city was taken by the Saracens shortly after the death



Cæsarea, Judea.

of Mohammed, and recaptured in 1101 by the crusaders, who built a cathedral upon the site of the ancient temple. It is now in ruins. II. An ancient city of the district of Cilicia in Cappadocia, originally called Mazaca, afterward Eusebia, and the residence of the kings of Cappadocia. It was taken by Tigranes, king of Armenia, who carried the people with other Cappadocians to his new town Tigranocerta, but some of them returned after the Romans took Tigranocerta. When Tiberius made Cappadocia a Roman province, he changed the name of Mazaca to Cæsarea, and made it the capital. In the reign of Valerian it was taken by Sapor, who slew many thousands of the inhabitants. At this time, about A. D. 255, it had a population of 400,000. In the reign of Justinian the walls were repaired, and when Cappadocia was divided into Prima and Secunda it was the capital of Cappadocia Prima. It was the birthplace of St. Basil the Great, who became bishop of Cæsarea A. D. 370. (See KAISARIYEH.)

CÆSAREAN SECTION, the taking of a child from the womb by cutting. Sextus Julius, an ancestor of Julius Cæsar, is said to have come into the world by this operation, and to have received accordingly the name of Cæsar (Lat. *cædere*, to cut), which was afterward retained as a family designation by his direct descendants; and the name Cæsarean section was subsequently given to the operation itself. The operation was first performed on women who died in childbirth before the child was born, as a means of saving the life of the infant, which would otherwise have been lost, as well as that of the mother. After the publication of the work of Eucharius Roslein, at Worms, in

1518 ("The Rose Garden for Midwives and Pregnant Women"), and the improvements in obstetric science made by Vesalius in Padua, 1548, the Cæsarean operation was not only performed in all such cases, but was commanded by law, as a means of saving the life of the child. In 1581 François Rousset, a surgeon in Paris, published a treatise in which he gave proofs of the possibility of safely performing the Cæsarean operation on the living mother, in cases of malformation and impossible natural delivery. He also first gave the present name to this operation, which from that time forward has often been performed on the living mother with complete success, though not invariably.—When from any cause the antero-posterior diameter of the superior strait of the pelvis, or the transverse diameter of the lower strait, is not more than $1\frac{1}{2}$ inch, the head of the child cannot pass, and there is no possibility of delivery *per vias naturales*. It then becomes necessary, if the child be living, to resort to the Cæsarean operation as the only means of delivery. Dr. Churchill, one of the highest authorities on this question, states "that in cases where the patient cannot be delivered by any other means, and where, consequently, both mother and child would inevitably die, a chance of saving the lives of both is afforded by the Cæsarean section." In this operation the walls of the abdomen are carefully opened in front of the uterus, which is also opened, and the child is taken directly from the womb, in lieu of passing through the natural descent. The best period for operating is at the commencement of the labor, provided there be no doubt as to its necessity. The strength of the parturient woman is then unimpaired; she can

near the operation better, and runs less risk of inflammation.

CÆSIUM, a metal discovered in 1860-'61 by Bunsen and Kirchhoff by means of spectrum analysis. It so closely resembles potassium in its properties that it had escaped the notice of chemists who pursued their investigations according to the ordinary methods of analysis. Bunsen, in his capacity of sanitary inspector of the mineral springs of Baden, received the residues from the evaporation of Dürkheim water, and in the course of a critical examination into its properties detected by two blue lines on the spectrum that something different from potash was manifestly present. He precipitated the new body with chloride of platinum, and by repeated washings separated it from its surroundings. In consequence of the color of the lines on the spectrum he gave the name of cæsium (Lat. *cæsius*, sky-blue) to the new element. The first publication on the subject was in the *Annalen* of Liebig and Wöhler for July, 1861. In 1864 Pisani found cæsium to the extent of 84 per cent. in a rare mineral from the island of Elba, called pollux. The metal has since been detected in carnallite and triphylite; in numerous salt brines; in the lepidolite of Hebron, Me., which Johnson found to contain 0.8 per cent.; in petalite, various sea shells, basaltic rocks, and occasionally in the ashes of plants, though it appears not to be readily assimilated by vegetables, and in this respect to resemble sodium. Cæsium is the most electro-positive of all the metals, and oxidizes so rapidly that Bunsen has not been able to give a full description of its properties. Compounds of cæsium, analogous to those obtained from potassium and sodium, have been prepared by chemists. They yield alums, soaps, and organic bodies, none of which have at present any application in the arts. The atomic weight of cæsium is 133, and its symbol is Cs.

CÆSIUS, *Bassus*, a Roman lyric poet of the 1st century. Only two lines of his poems are extant, one being quoted by Priscian and another by Diomedes; but he was praised by Quintilian, and Persius addressed a satire to him. He is said to have been destroyed with his villa by the eruption of Vesuvius which buried Herculaneum and Pompeii (79).

CAF, or *Kaf*, a mountain range which, according to the Arabic and Persian legends, encircles the earth. The sun rises from behind it, and again sets behind it. "From Caf to Caf" is from one end of the world to the other. The pivot upon which the mountain rests is a huge emerald, named Sakhrul, from the reflection of which earthquakes proceed, and the sky receives its color. The mountain is inhabited by genii and giants.

CAFFARELLI, an Italian vocalist, whose real name was GAETANO MAJORANO, born at or near Bari in 1703, died in Naples in 1788. He was the son of a poor peasant, and his fine voice early attracting attention, it was culti-

vated under the tuition of the musician Caffaro, after whom he assumed the name of Caffarelli (little Caffaro). His father had him castrated, and after six years' study under Porpora of Naples, who declared him to be the finest singer of Italy if not of the world, he first appeared in 1728 at the Valle theatre in Rome, assuming a female part, as was usual with male soprano singers of those days, and his handsome face increased the number of his admirers. In 1780 he won new success and acquired a large fortune in England, after which he received at Venice the then unprecedented annual salary of 800 sequins (about \$2,000). In 1750 he sang wonderfully in sacred music at the court of France, but offended Louis XV. by insisting upon receiving in addition to another present the king's portrait, which was given only to foreign ministers, remarking that all the ambassadors in the world could not produce one single Caffarelli. He was immediately ordered to leave France, and on his return to Italy purchased the dominion of San Dorato, and built a palace on which he put the inscription, *Amphion Thabas, ego domum*. He had no rival excepting perhaps Farinelli in the compass, flexibility, beauty, and blended vigor and sweetness of his voice. He also had some talent for composition, and enriched Italian music with new and brilliant chromatic scales.

CAFFARELLI, *François Marie Auguste*, a French soldier, born at Falga, in the present department of Haute-Garonne, Oct. 7, 1766, died at Leschelles, Aisne, Jan. 23, 1849. He was descended from a patrician Italian family. After the revolution of 1789 he entered the French army, and from Napoleon's regard for his brother was promoted to be aide-de-camp and brigadier general; and in reward for his having prevailed on the pope in 1804 to officiate personally at the emperor's coronation in Paris, he was appointed governor of the Tuileries (1805) and general of division. From 1806 to 1810 he was minister of war and the navy in the kingdom of Italy, and from 1811 to 1818 he distinguished himself in the peninsular war against the Spanish and English. He was made a peer in 1831.

CAFFARELLI DU FALGA, *Louis Marie Joseph Maximilien*, a French soldier, elder brother of the preceding, born at Falga, Feb. 13, 1756, died near St. Jean d'Acre, Syria, April 27, 1799. The eldest of ten children who became orphans at an early age, he divided equally among them an extensive inheritance, though he was legally entitled to half of it. He favored the revolution of 1789, and served as captain in the army on the Rhine; but having publicly expressed his disapproval of the execution of Louis XVI., he was confined to his country seat. Subsequently restored, he crossed the Rhine under Kléber near Düsseldorf in September, 1795, and lost his left leg near Creuznach. At Napoleon's request he assumed in September, 1798, the command of the engineer

corps in Egypt, with the rank of brigadier general. Having, in the Syrian campaign, initiated the siege operations at St. Jean d'Acre, he was shot in the left arm, April 9, 1799, and died from fever setting in after amputation. His writings on mathematics and philosophy, chiefly in periodicals, and his labors in behalf of education led to his admission to the French academy.

CAFFEINE, the active principle in coffee, first extracted by Runge in 1820. It is a weak alkaloid, identical in chemical composition with theine, the active principle of tea. Being found in all the varieties of coffee as well as of tea, which are used as drinks by a large portion of the human race, it no doubt possesses some properties of importance to the animal system. Very few other substances contain so large a proportion of nitrogen as caffeine, its percentage of this element amounting to 21.6. Its composition, as shown by Liebig, is represented by the formula $C_8H_{10}N_4O_2$, by which it appears to be closely related to some of the nitrogenized constituents of bile, as taurine, also to methyl-theobromine. It is obtained crystallized in long silky needles of a white color, which are fusible and volatile, and are easily dissolved in water, alcohol, and ether. To a decoction of coffee or tea acetate of lead is added to precipitate the caffeotannic acid. This is separated from the solution by filtering, and the excess of lead is removed by its precipitation by sulphuretted hydrogen. The liquor, again filtered, is then evaporated, and the caffeine crystallizes. It is purified by dissolving and again crystallizing. The quantity obtained from coffee is generally about 1 per cent., which is only one half the amount furnished by tea; as the infusions are prepared, however, for ordinary use, more of the active principle is contained in a cup of coffee than in one of tea. Robiquet and Boutron give much larger proportions than 1 per cent. In Java coffee they found 4.4 per cent. of caffeine, and in Martinique coffee 6.4 per cent. Caffeine has a bitter taste, and acts powerfully upon the system when taken in doses of from 2 to 10 grains. It causes palpitation of the heart, great irregularity of the pulse, oppressions in the chest and pains in the head, confusion of the senses of hearing and seeing, sleeplessness, and delirium. The substance may be recognized by its great volatility, and the property it possesses, when dissolved in nitric acid, evaporated to dryness, and exposed to ammoniacal gas, of giving a pink-colored bluish. Caffeine evaporated to dryness with a little chlorine water yields a purple-red residue, which becomes golden yellow when more strongly heated, but red again on addition of ammonia; by this reaction it may be detected even in a single coffee bean.—Caffeine has been formed synthetically by treating the silver compound of theobromine with methyl-iodide. On a large scale caffeine can be prepared from tea by heating the concentrated aqueous decoction

with litharge, evaporating the decanted liquid to a sirup, and treating it with pearlsh and alcohol. Claus finds that the inferior commercial sorts of tea are richer in caffeine than the finer and more fragrant varieties.—Caffeine is sometimes used in medicine to produce sleep, allay nervous irritability, and relieve sick headache. It should only be used for these purposes in cases of debility. Inflammation contraindicates its use. The dose is one or two grains repeated every hour till eight or ten grains are taken if necessary.

CAFFI, Ippolito, an Italian painter, born in Belluno in 1814. He studied in Venice and Rome, visited the East, and in 1848 barely escaped being shot by the Austrian authorities on account of his participation in revolutionary outbreaks. After the capitulation of Venice he took up his residence in Piedmont. He excels in monumental views by an original disposition of light and shade. His most celebrated picture is "The Carnival in Rome," which was exhibited at the Paris exposition of 1855, and which he has reproduced more than 40 times.

CAFFRARIA, or *Kaffraria*. L. Also called *Ka-irland*, a country in the E. part of South Africa, between Cape Colony and Natal, extending N. on the coast from the Great Kei river to the Umzimvubu, about 140 m., and inland about 90 m. to the Storm and Quathlamba mountains, between lat. 30° and 32° 40' S., and lon. 27° 30' and 30° E.; area, about 16,000 sq. m.; pop. about 135,000. Before the British encroachments Caffraria extended 600 m. along the coast from the Great Kei river to Delagoa bay, and included what is now Natal and Zooloo Land.



Zooloo Youths in Dancing Costume.

loo Land. The climate is warm, but healthy; the lower parts of the hillsides are cultivated principally with maize, millet, and water-

melons; and large herds of cattle graze on the plains, which are well watered and are covered with a coarse luxuriant growth of grass. The Caffres, from whom the land receives its name, were so called by the Mohammedans, who applied to them the Arabic name *Kafir*, unbeliever. The men are powerfully and symmetrically built, the females superior in beauty to the other native races of southern Africa. The complexion of the southern Caffres is brown or copper color; it becomes darker further north, until it is deep black. Their hair is black and woolly; the nose and forehead approach the European type; the cheek bones resemble those of the Hottentot, and the lips are thick and prominent. They have but little beard. Their language is unwritten, but is rich, and superior to the speech of the Bushmen and Hottentots. Their government is patriarchal; a petty chief presides over every kraal or hamlet, and is tributary to a higher chief. These higher chiefs owe allegiance to the *umkumkani*, or great chief, and form the national council. They live by the raising of cattle and hunting. Their agriculture is attended to by the women. They have no notion of a supreme being, but are devout believers in witchcraft and spirits, and the shades of their ancestors. A Caffre swears by the spirit of his ancestor. Their charm doctors, rain makers, and prophets exercise great power. They circumcise boys at the age of 12 or 14, and abhor the flesh of swine and all fish except shell fish, and milk is their principal food. Christianity has not made much way among the Caffres, although missionary stations have been planted there for 40 years; but there is a Christian church among the Griquas, considerable numbers of whom migrated to Caffraria in 1863, and in 1871 the church had 5,000 members. The great stumbling-block is the Christian doctrine of monogamy, every Caffre having as many wives as he can buy and support. Their huts are hemispherical, thatched with straw and plastered with cow dung. There is no chimney; the fireplace is in the centre. They preserve their millet in pits dug in the ground. The men wear but little clothing, are sometimes tattooed, and often go totally naked. The Caffres are divided into three tribes: 1, the Amakosa, who border upon the British settlements, and were stripped of the greater part of their territory in the war of 1847; 2, the Amatamba or Tambookis, whose westernmost territories border on the back territory of the colony toward the sources of the Great Kei; and 3, the Amaponda or Mambookis, further N. E. Their native weapons are clubs and javelins, but they have learned the use of firearms from their enemies, and are very formidable opponents in mountain and bush warfare. The climate of Caffraria is healthy and well adapted to the European constitution. The country is beautifully wooded, rising in terraces from south to north, and is watered by several rivers. The aloe, the gum tree, and

the plantain abound; lions, elephants, hippopotami, and rhinoceroses are to be found, but are becoming rare. II. *British*, a district S. of the preceding, extending from the Keiskama to the Great Kei river, and divided into the counties of Northumberland, York, Sussex, Middlesex, Cambridge, Lincoln, and Bedford; pop. in 1866, 69,777, including 5,847 white or European. The capital is Williamstown on the Buffalo river, and the new town of East London is at its mouth. The annexation of this dependency resulted from the Caffre war of 1847. For 20 years previous the settlers in the district of Albany, adjoining on the south, had suffered from irruptions of the Caffres. In 1847 they were subdued, but in 1850 hostilities were renewed and continued two years, at a cost to the British government of £1,500,000 and the loss of many lives. On Dec. 20, 1852, Gen. Cathcart defeated the Basutos, a Caffre tribe, on the Berea mountain, and shortly after three chiefs submitted, thus ending the war; and a treaty of peace was ratified at Williamstown, March 9, 1853. In 1866 the dependency was incorporated with Cape Colony, but retained its name. The Caffre population of this dependency has been partially won over to civilization. The importation of arms, gunpowder, and spirituous liquors among them is strictly forbidden.

CAFFRISTAN. See KAFIRISTAN.

CAGAYAN. See LUZON.

CAGAYAN SOOLOO, an island of the Malay archipelago, in the sea of Mindoro, intersected by lat. 7° N. and lon. 118° 36' E.; area, 298 sq. m.; pop. about 12,000. This island was formerly occupied by a race of Moorish pirates who plundered the archipelago, but the advance of European commerce has exterminated them. The people resemble the Malay race, but speak a language entirely different, partaking somewhat of the character of the Tagala in construction, and having many words used in the several Philippine languages. The Arabic character is used in writing. The islanders cultivate rice, and have enclosures of well assorted fruit trees; they plough with oxen, rear a variety of domestic poultry, make handsome garments, and fabricate their own weapons and implements. The island is regarded as a dependency of Manila.

CAGLI (anc. *Callis*), a town of Italy, in the province of Pesaro ed Urbino, at the confluence of the Cantiano and Busso, 14 m. S. of Urbino; pop. about 10,000. It is the seat of a Catholic bishop. The churches contain some remarkable mediæval paintings, including frescoes in a chapel of the church of San Domenico by Giovanni Sanzio, father of Raphael. The town has a trade in dressed skins.

CAGLIARI. I. A province of the kingdom of Italy, forming the S. portion of the island of Sardinia, bounded N. by Sassari and on all other sides by the sea; area, 5,224 sq. m.; pop. in 1872, 392,981. It comprises the four districts of Cagliari, Iglesias, Lanusei, and Oris-

tano. The soil is throughout mountainous, the highest points being Monte d'Olestra, in the district of Lanusei, and Monte Arcueto, in the district of Iglesias. It is watered by the Tirso, Samassi, Flumendosa, and several smaller streams. All kinds of grain are cultivated, and the breeding of cattle and cultivation of forests are also of considerable importance. The mines produce iron and silver ore, lead, and antimony. On the coast salt is produced in large quantities. II. The capital of the province (anc. *Caralis*), situated at the bottom of a bay of the same name, on the S. coast, in lat. 39° 13' N., lon. 9° 7' E.; pop. about 28,000. It is built on the slope of a steep hill which rises from the coast, and it presents an imposing appearance from the sea. The highest part contains the principal public buildings: the castle, with the viceregal palace; the cathedral, built during the 14th century; and the university, with the departments of theology, law, medicine, philosophy, and belles-lettres. Cagliari has also a public library, a museum of natural history and antiquities, several public seminaries, a theatre, a mint, many churches, and upward of 20 convents. It is the see of an archbishop, and the principal port of the island. Its more important exports are corn, oil, wine, tobacco, firearms, and soap. It was founded by the Carthaginians, and after the Roman conquest was a naval station and residence of the prætor. Remains of the ancient city are still to be seen. A submarine telegraph communicating with Bona in Algeria, and another with Malta, have been in operation since 1857. There are extensive salt works on the shores of the bay.

CAGLIARI, or *Callari*, **Paolo**, commonly known as **PAUL VERONESE**, an Italian painter of the Venetian school, born in Verona about 1580, died in Venice in 1588. His father, Gabriele Cagliari, a sculptor, instructed him in drawing and modelling; but he afterward entered the studio of his uncle, Antonio Badile, a Veronese painter of some eminence. After executing some designs in fresco on the dome of the cathedral at Mantua, for the cardinal Gonzaga, he went to Venice, where he passed the remainder of his life. The work which first brought him into notice was the story of Esther painted on the ceilings of the church of St. Sebastian, under which he lies buried, and which contains a great number of his works. A journey to Rome in the suite of the Venetian ambassador, Grimani, enabled him to study the works of Raphael and the elder masters. His history after his return to Venice is a record of continued and brilliant success. He distributed his paintings among the churches and convents, and would seldom take from them more than the price of his canvas and colors; for his great picture of the marriage in Cana, painted for the refectory of the convent of San Giorgio Maggiore, he received, it is said, only 90 ducats. He was distinguished for the freedom and boldness of his designs, the brilliant

coloring of his costumes and accessories, and his wonderful facility. No painter ever more frequently violated the proprieties of chronology, or more openly disregarded fact and probability. In his picture of the family of Darius brought before Alexander, now in the British national gallery, the men are Venetian soldiers, senators, and citizens, the women are Venetian ladies, the architecture is of the ornate 16th century style, and the costume of the same period. In the "Rape of Europa," now at Vienna, Europa is a noble Venetian dame, sumptuously attired, and her attendants are modern maids of honor. The celebrated picture of the marriage in Cana, 30 feet by 29, now in the Louvre, is one of the best specimens of his representations of festive meetings, on which his reputation principally rests. There are three other festival pictures on a similar scale: Christ entertained by Levi, now in the academy of Venice; the supper in the house of Simon the Pharisee, with Mary Magdalene washing the feet of Christ, now in the Durazzo palace at Genoa; and the supper at Emmaus. Of his more purely religious subjects, the three pictures representing the death of St. Sebastian, in the church of that name in Venice, are among the finest for color and composition he ever painted. His Scriptural, mythological, and allegorical pictures are almost innumerable, and many excellent specimens are to be found at Venice, Milan, and in the Louvre. Of his allegorical subjects, his "Venice crowned by Fame," on the ceiling of the Maggior Consiglio hall, is an admirable specimen.

CAGLIOSTRO, **Alessandro di**, count, an Italian charlatan, born in Palermo, June 2, 1743, died in the dungeon of Fort San Leon, in the duchy of Urbino, in 1795. The name and title by which he is known were both invented by himself. He was of humble parentage, and his real name was Giuseppe Balsamo. At the age of 15 he ran away from a seminary where he had been placed, but was caught and placed in a monastery, where he became assistant to the apothecary, from whom he learned something of the properties of drugs. By 1759 he had become the shrewdest rogue in Palermo. Sicily became too hot for him, and he made his exit by obtaining money from a goldsmith under the pretence of helping him to a treasure. With this money he set about travelling, together with a companion to whom he gave the name of Alhotas. He assumed a different name and character in every different country, now appearing as a necromancer, then as a nobleman, again as a naturalist or physician, while the daily exercise of old tricks and the concoction of new ones imparted an inexhaustible elasticity to his inventive genius. With Alhotas, according to his own account, he explored Greece, Egypt, Turkey, and Arabia. At Medina he was the guest of a distinguished mufti, and at Mecca a favorite with the sheriff. His smattering of medical science stood him in

good stead. His audacity grew with his success. In 1770 he visited the grand master of the knights of Malta, and introduced himself as the count di Cagliostro, a name which he invented for this special occasion, and which he afterward retained. His subsequent brilliant career was due to this interview, for the commander of the knights of Malta supplied him with letters of introduction which gave him for the first time access to the Italian nobility. Fearing that this recommendation would not be sufficient, after his arrival at Venice he married a beautiful woman, Lorenza Feliciana, and travelled with her through upper Italy. She succeeded in making dupes, by her feminine cunning, in quarters where his coarser deceptions would have failed. Her business was to captivate the hearts of the people, while he, by turns doctor, naturalist, alchemist, freemason, fanatic, sorcerer, spiritualist, necromancer, exorciser, seized hold of the mind and the imagination of his dupes. After having done a thriving business in Italy, he made his appearance in Germany, where he offered for sale an elixir which insured perpetual life and never-fading beauty; its operation, he used to say, was manifest in his own person, as he frequently passed himself off for 100, 150, or 200 years old, his wife assisting him by speaking of their son as being a captain in the naval service of the king of Holland, and 50 years old, while she herself hardly looked older than 20. From Germany he passed to Russia, but instead of repairing at once to St. Petersburg, he halted in Courland, where many of the nobles resided. In 1779, while at Mitau, he gathered around him the first ladies of the town, and founded a masonic lodge in which high-born ladies were admitted as members. He conjured spirits before the nobility of Mitau, and delivered mystic lectures; and before the enthusiasm of his dupes had reached its climax, he departed for St. Petersburg. But here he was disappointed. Catharine II. laughed at him, and at his female disciples of Courland. He left Russia for France, arrived at Strasburg in 1780, and at once went to work upon the bishop of the city by apparently effecting some wonderful cures. The news of this miracle spread over France. The Parisians received Cagliostro with open arms, and in 1785 he took up his abode in the rue St. Claude. His laboratory was thronged with persons eager for elixirs and for communion with spirits. Here he revived what he called an old Egyptian masonic order, of which he had become the grand kophta, whose chief mission it was to impart to the members the power of making gold and of keeping death at a distance. The most notable personages of the French court were his disciples; above all, Cardinal Roban. Cagliostro became implicated in the diamond necklace scandal, and was taken to the Bastille. As nothing could be proved against him, he was liberated; but he was expelled from France, and repaired to England, where he

met with little success. Elisa von der Recke, his most fervent Mitau disciple, turned against him, and exposed him in a book entitled *Nachricht von des berühmigten Cagliostro Aufenthalt in Mitau* (Berlin, 1787). This caused his expulsion from Germany. He went to Switzerland, then to Sardinia, and at last to Rome, where he attempted to found a new masonic lodge, but fell into the hands of the inquisition, and was sentenced to death. The sentence being commuted to imprisonment for life, he passed his last eight years in a dungeon. His wife, who was kept in durance in a convent, died a few years afterward. Many accounts of Cagliostro have been published, the best being that by Thomas Carlyle, contained in his "Essays."

CAGNOLA, Luigi, marquis, an Italian architect, born in Milan in 1762, died Aug. 14, 1833. Although born of a noble family and educated for political life, a passion for architecture nevertheless absorbed him. His greatest works are two triumphal arches at Milan, one known as the *arco della pace*, originally built of wood on occasion of the marriage of Eugene Beauharnais in 1806, but finally finished in marble after Cagnola's death; the other is the *Porta di Marengo*, an Ionic propylæum of great beauty. He also built the campanile at Urgnano, an ornate structure 190 ft. high, and several churches at Milan and elsewhere, the finest being at Ghisalba in the Bergamese. Some of his designs were on a scale so magnificent as to be wholly impracticable. One of these was for a hospice on Mont Cenis, with 110 columns, each 11 ft. in diameter.

CAGNOLI, Antonio, an Italian mathematician, born at Zante, Sept. 29, 1748, died in Verona, Aug. 6, 1816. The son of a functionary of the republic of Venice, he spent some time as secretary of legation at Madrid, and subsequently went to Paris, where he devoted himself to the study of astronomy, and built an observatory. Afterward he lived at Verona till 1797, when the French invasion compelled him to leave the city. He taught astronomy at Modena for a time, and finally returned to Verona. He was the author of works on astronomy and trigonometry, and of many papers in the memoirs of the Italian society.

CAGOTS, a formerly proscribed and outcast race of E. and S. France and N. Spain, whose origin has been ascribed to the Visigoths of Aquitaine, whence the somewhat forced derivation from *caos Goths* or Gothic dogs. According to other and equally vague traditions, they sprang from the Saracens who lingered behind in France after their defeats by Charles Martel in 732-'9; and they were also variously regarded as descendants of leprous crusaders and Jews, and as heretics and sodomites. Banished from all human haunts, their degenerate condition was chiefly attributable to their intermarrying, and to their miserable way of life in the recesses of the Pyrenees; and the belief in their being lepers has become obsolete.

For a considerable period they were doomed to wear emblems of their degradation, and in the churches of Luz and of Lannemezan the separate places of worship formerly assigned to them are still visible. They were not allowed to enter the priesthood, and although efforts for their relief were made in the 18th century, political and social rights were not granted to them till 1798. In the valley of Luchon and in other places where they exist in considerable numbers, they are still considered a distinct class; but at the present day they are generally extinct as a separate race through intermixture with the mass of the population. Their distinguishing deformity consisted in round ears without lobes, and many of them were afflicted with the goitre. They were remarkable for their loquacity, and experience has shown that they are susceptible of considerable improvement.—See *Histoire des races maudites de la France et de l'Espagne*, by Francisque Xavier Michel (2 vols., Paris, 1847).

CAHAGNET, Louis Alphonse, a French spiritualist, born in Caen in 1809. He worked at various trades previous to experimenting in magnetism and spiritualism. His principal works are: *Arcanes de la vie future dévoilés* (3 vols., 1854-'60); *Encyclopédie magnétique spiritualiste* (7 vols., 1854-'61); and *Force et matière* (1866), refuting the theories of Büchner.

CAHAWBA, a river of Alabama, rises in Jefferson co., flows S. W. and S., and, after passing through a rich coal region, joins the Alabama at Cahawba, in Dallas co., 8 m. S. W. of Selma.

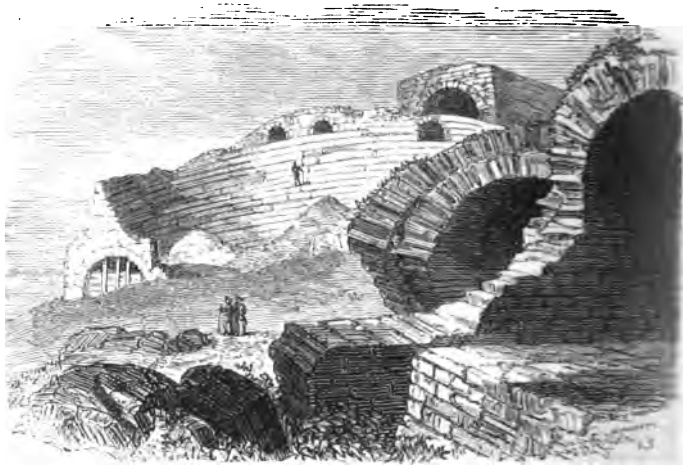
It is navigable by small boats for 100 m.

CAHEN, Samuel, a French Hebraist of Jewish parentage, born at Metz, Aug. 4, 1796, died Jan. 8, 1862. He early spent some years in Mentz, where he was to pursue a course of rabbinical studies, but chiefly devoted his attention to modern languages and literature. He was afterward a private teacher in Germany, and in 1822 went to Paris, where he was director of the Jewish consistorial school for several years. He founded (1840) and edited the *Archives israélites*, a monthly periodical, and lectured and wrote on the Hebrew language and history. His principal work was a translation of the Old Testament into French, with the Hebrew on opposite pages and critical notes and dissertations by himself and others, which he completed in 1851 (18 vols. 8vo, Paris).

CAHINCA, a drug derived from one or more species of *chiococcus*, a genus of the order

rubiaceæ. Cahinca or cainca is the Indian name of the plant, which is known to the Portuguese of Brazil as *raiz preta*. It is said to be diuretic, emetic, and purgative, and is considerably used by the natives of Brazil. It is but little employed, however, in general practice. Like a large number of other plants, it has been supposed to be beneficial in cases of snake bite.

CAHORS, a town of France, capital of the department of Lot, on the right bank of the river Lot, which encloses the town on three sides, 60 m. N. of Toulouse; pop. in 1866, 14,115. It stands on a rocky eminence, and has steep and narrow streets. Vestiges of a Roman amphitheatre, aqueduct, and portico are still to be seen. Of the three bridges over the Lot, one, probably built in the 14th century, is surmounted by three towers, to defend the approach to the town. Cahors is the seat of a bishopric, the occupant of which during the middle ages held the title of count, and wore



Roman Amphitheatre at Cahors.

a sword and gauntlets, which he deposited on the altar when he said mass. The cathedral is a large and ancient building. The old episcopal palace is now the prefect's residence. Among the public institutions are a theological seminary, two public libraries, a lyceum, an agricultural society, provincial college, and theatre. Pope John XXII. and Joachim Murat were born here. The university, which was founded in the 14th century, but suppressed after the revolution of 1789, had the famous jurist Cujas as one of its professors, and among its pupils was Fénelon, whose monument is placed in front of the college. There are some manufactures of cloth and other woollen stuffs, and a considerable trade in wines, leaf tobacco, brandies, oil, and truffles. During the middle ages Cahors was famous for its usurers. The capture of Cahors in 1580 was one of the most brilliant exploits of Henry of Navarre.

CAIAPHAS (styled by Josephus "Joseph who was also Caiaphas"), a Jewish high priest from about A. D. 27 to 36. He was appointed by the Roman procurator Valerius Gratus in place of Simon son of Camith, and having been deposed by the proconsul Vitellius was succeeded by Jonathan, son of Annas or Ananus. Annas, the father-in-law of Caiaphas, had formerly been high priest, and in the Gospel of Luke the names of Caiaphas and Annas are coupled together as high priests. Some have supposed that they exercised the functions of the office jointly or by turns; others, that Annas was so called because he had formerly been high priest; but the prevalent theory is that Annas was at the time of the trial of Christ the *sagan* or deputy of Caiaphas. Jesus, having been apprehended, was first brought before Annas, by whom he was sent to Caiaphas. The latter, not having the power of capital punishment, sent him to Pilate, the Roman governor, who unwillingly condemned him to death. Caiaphas belonged to the sect of the Sadducees, and opposed the early labors of the apostles.

CAICOS, Caycos, or The Keys, four of the Bahama islands, called Great, Little, and North Keys, and Providence island. Some islets and rocks are generally included with them under the name of Caicos. The Great Key is 30 m. long. They are under the government of Jamaica.

CAILLE, Nicolas Louis de la. See LA CAILLE.

CAILLET, Guillaume. See JACQUERIE.

CAILLIAUD, Frédéric, a French traveller, born in Nantes in 1787, died there, May 1, 1869. In 1809 he was working as a goldsmith in Paris, and also attended the lectures at the museum, giving special attention to mineralogy. From 1813 to 1815 he travelled as a worker in gold through Belgium, Holland, and Italy, and then went through Asia Minor to Egypt, where he made large collections in natural history and antiquities. He was employed by Mehemet Ali to explore the deserts on both sides of the Nile and near the Red sea, and discovered the famous emerald mines of Mount Zabarah. He continued his researches in Nubia, visited Thebes, discovered one of the ancient lines of commerce from Egypt to India, and returned to France with a large collection of minerals, plants, and antiquities, which, with his journal, were purchased by the French government. From these materials M. Jomard prepared the *Voyage à l'oasis de Thèbes*, &c. (2 vols. fol., Paris, 1821). Cailliaud returned to Egypt under the patronage of the government, explored the eastern desert, reaching the city of Siwah and visiting the temple of Jupiter Ammon, and sent to France the materials for his *Voyage à l'oasis de Syouah* (fol., Paris, 1823). He had remained in Egypt, and in 1821 accompanied Ismael Bey in an expedition to Upper Nubia, which penetrated the mountainous region as far as lat. 10° N. Returning to France in 1822, he published his most important work, the *Voyage à Meroë*, &c.,

de 1819 à 1822 (4 vols. 8vo, Paris, 1826-'7). His collection of more than 500 articles was purchased by the French government. It included a mummy, inscribed with hieroglyphical characters, with a Greek translation side by side, which was of great service to Champollion the younger in his study of the phonetic alphabet and symbols. Cailliaud afterward became conservator of the museum of Nantes, and wrote *Recherches sur les arts et métiers, les usages de la vie civile et domestique des anciens peuples de l'Égypte, de la Nubie et de l'Éthiopie*, &c. (2 vols. 4to, Paris, 1831-'7). He also published several works upon natural history, especially in the department of conchology.

CAILLIÉ, René, a French traveller, born at Mauzé in 1799, died May 28, 1838. When only 16 years old he set out on a voyage to Senegal, and afterward accompanied a caravan to Bondoo, where he joined an English exploring expedition. This having been thwarted, he returned to France, and in 1824 set out again for Senegal, and made preparations to penetrate into the interior of Soodan. He left Kakondy April 19, 1827, and after many hardships and detention by illness of five months reached Jenne, on the Niger, March 11, 1828. A month's sail on the Niger brought him to Timbuctoo, where he spent 14 days, and then, joining a caravan, he made a journey across the desert to Fez and Morocco, returning to France in the latter part of 1828. The geographical society of Paris awarded him a prize of 10,000 francs, which had been offered to the first traveller who should visit Timbuctoo, and the annual prize of 1,000 francs for the most important discovery. He also received a pension and the order of the legion of honor. His *Journal d'un voyage à Tombouctou et à Yenné, dans l'Afrique centrale*, with geographical notes by M. Jomard, was published at the cost of the French government (8 vols. 8vo, Paris, 1830). He retired to a small estate which he had purchased in the department of Charente-Inférieure, and was projecting another journey in Africa at the time of his death.

CAIN, eldest son of Adam and Eve, a cultivator of the soil, killed his brother Abel, who was a keeper of flocks, and was condemned to be a fugitive and vagabond on the earth. He retired to the land of Nod, on the east of Eden, where he built a city, which he called Enoch, from the name of his son.

CAINITES, a sect of the 2d century, who paid homage to all the reprobate characters mentioned in sacred history. Cain, from whom they took their name, and Judas Iscariot, of whom they had a forged gospel, were objects of their particular veneration. They were a branch of the Gnostics, and admitted great numbers and various ranks of genii and virtues.

ÇA IRA, a revolutionary song popular in France during the reign of terror. Originally the music was a favorite air of Marie Antoinette, who was doomed to hear it again on her way to the guillotine. For four years it ac-

accompanied the victims of the first revolution to the guillotine with the refrain :

" Ah, ça ira, ça ira, ça ira,
Les aristocrates à la lanterne."

Napoleon, on entering upon the consulate, prohibited this and all other songs which savored of the reign of terror. Yet, like the *Marseillaise*, the *Carmagnole*, and the *Chant du départ*, it became one of the French national songs.

CAIRD, James, a Scottish agriculturist, born at Stranraer, county of Wigton, in 1816. He was educated at Edinburgh, leased a farm from the earl of Galloway, and in 1849 published a treatise on "High Farming as the best Substitute for Protection." In 1850-'51 he visited every county in England as agricultural commissioner for the "Times" newspaper, and his reports were collected into a volume. He subsequently visited the United States, and in 1858 published an account of a visit to the prairies. In 1857 he was returned to parliament for Dartmouth, and in 1859 for Stirling. In 1860 he was appointed a member of the fishery board, and in 1863 chairman of the royal commission on sea fisheries, whose final report was presented in 1866. In 1864 he carried through parliament a resolution for the collection of agricultural statistics, in consequence of which these have been published annually since 1866. His seat in parliament was vacated in 1865 by his acceptance of office as one of the enclosure commissioners. In 1868 and 1869 he prepared papers on "the Food of the People," which were read before the statistical society, and were afterward published. He is a magistrate and deputy lieutenant of the county of Wigton.

CAIRD, John, a Scottish clergyman, born at Greenock in 1823. He studied at the university of Glasgow, was licensed as a preacher in 1844, and soon afterward became minister in Edinburgh, but in 1850 went to Errol. In 1858 he delivered in the parish church at Crathy, before the queen and royal family, a discourse on "Religion in Common Life," which, being published by the royal command, excited much attention. In 1858 he removed to Glasgow, and came to be considered one of the most eloquent preachers in Scotland. A volume of his sermons has been published.

CAIRO (Arab. *Kahireh*, the victorious, or *Musr el-Kahireh*; called by the natives *Musr*), the capital of Egypt, the most populous city of Africa, and after Constantinople of the Turkish empire, situated about a mile from the right bank of the Nile, about 10 m. above the apex of the delta of that river, and 120 m. S. E. of Alexandria; lat. 30° 2' N., lon. 31° 16' E.; pop. in 1871, 353,851, of whom about three fourths were Mohammedans, 60,000 Copts, and the rest chiefly native Jews and Greeks, Armenians, and Europeans. It lies mostly on the level plain of the Nile valley, but the S. E. part, including the citadel, is built upon a spur of the Mokkatam mountains. Cairo occupies a

site of about seven miles in circumference, and presents from without an enchanting spectacle, but within the appearance is far from being attractive. The houses of the poor are built of mud or of sun-baked bricks, and are only one story in height. Those of the richer class are built of brick, wood, and a soft stone quarried in the neighboring Mokkatam mountains, and are two and frequently three stories high. The streets are generally in a neglected condition, unpaved and dusty, but in some of the principal parts of the city and suburbs they have been widened for carriages. Very little rain falls at Cairo, and a heavy shower is considered a calamity; for then the moistened



A Modern Street in Cairo.

garbage in the streets undergoes a rapid decomposition, producing pestiferous exhalations. The water which during the overflow of the Nile is conveyed into the city by a canal becomes stagnant in May and June, and is another cause of disease. The usual mode of conveyance is by donkeys, horses being rarely employed, and the use of carriages not being practicable except in a few streets. The principal public place, called the Esbekiyah, is planted with shrubs and trees, and crossed by walks. There are many baths, which are more cleanly than in other eastern cities. There are also many caravansaries or inns, and large

storehouses; the extensive bazaars present a goodly array of the merchandise of the East. There are many public fountains, often elaborately ornamented with arabesque work, and a great number of coffee houses, some of which are highly interesting during the fast of Ramadan, when the performances of the Karagius, or Turkish Punch, take place. But the boast of Cairo is its mosques, of which there are said to be as many as 400, some of them elegant specimens of Arabian architecture. The most celebrated mosque is that of Sultan Hassan, situated near the citadel. It has a magnificent entrance beautifully embellished with honeycombed tracery. The interior is an unroofed court, having on each side a square recess covered with a noble arch. At the E. end is a niche for prayer and a pulpit with some colored glass vases of Syrian manufacture, bearing the name of the sultan, suspended on either side. Behind, and forming a portion of the edifice, built of stone and surmounted with a dome, is the tomb. Attached to another mosque is a hospital for insane and other helpless persons, who are gratuitously supported in great numbers. The mosque El-Azhar is celebrated for the beauty of its architecture, and for a college to which hundreds of students resort from all parts of the Mohammedan world, and which is the great centre of the study of Arabian literature. The mosque of Tulun, founded A. D. 879, contains specimens of the pointed arch, which was afterward introduced into Europe, and is one of the distinguishing characteristics of the Gothic style of architecture. N. E. of the city, just outside of the walls, are a number of beautiful

and other buildings, and a splendid mosque, begun by Mehemet Ali. Within the citadel is a deep well cut through the rock to the depth of 280 ft., intended to supply the citadel in case of siege. It consists of two portions, the upper part being an oblong square, 24 ft. by 18, and 155



Mosque of Mehemet Ali.

ft. deep, and the lower having a similar shape, 51 ft. by 9, and 125 ft. deep. The water, which is brackish and not used for drinking, is raised from the lower well into a basin at the bottom of the upper, whence it is conveyed to the citadel above. It is commonly designated Joseph's well, after Saladin, who is said to have constructed it, and who was also called Joseph. It is vulgarly ascribed to the son of Jacob. The citadel, which affords a splendid view of the city, of the Nile, and of the pyramids, commands the city, but is itself commanded by a neighboring ridge of the Mokkattam mountains, and is therefore of no utility against an attack from without.—The different races who inhabit Cairo live in distinct quarters, of which there are many, as the Jews' quarter, the Frank quarter, the Coptic quarter, &c. The streets leading to each quarter are closed at night by gates. The city is divided for purposes of police regulation into eight wards, each of which has a separate presiding officer, while the whole are under the superintendence of one common chief. Each trade or calling has also its sheikh or head, who is in some measure responsible for the conduct of the members of his guild. Justice is administered in a summary manner; and breaches of the public peace are said to be less common than in some European cities. The khedive maintains a theatre for French comedy, and an opera house, with a good ballet. In the Frank quarter are the library of the Egyptian society, and the Egyptian library association. Ibrahim Pasha's library comprised the works of the most noted Arabic and Turkish authors. The same prince began the collection of Egyptian antiquities, and there is also a similar collection



Ruined Mosque of Tulun.

mosques, built over the tombs of the Circassian and Borgite Mamelukes. In the S. E. part of the town is the citadel, on a hill, 250 feet above the rest of the city, containing the palace of the khedive, the mint, a manufactory of arms, various government offices, barracks,

which belonged to Mehemet Ali. The medical academy, established in 1827 by Mehemet Ali in the hospital of Abuzabel, was afterward transferred to Cairo, but, being unfavorably affected by the reverses of 1840, did not give many signs of vitality till 1856, when it was reestablished on a larger and improved scale in a charming locality on the shores of the Nile, within a short distance of Cairo. An academy, chiefly designed for the military profession, but embracing the general branches of European education, was opened in 1855 by Solyman Pasha, and received the sanction of the government in 1856. There are also Protestant and Catholic charitable institutions, where persons of all creeds are treated alike. The Americans have a religious mission in the city. Cairo has two suburbs, Boolak and Musr el-Aatik (old Musr, or capital, to distinguish it from Cairo, which is now the *musr*). This latter suburb is also called Fostat, and by Europeans, improperly, Old Cairo. Both these suburbs are on the bank of the Nile, and serve as ports to the city. Fostat contains some ancient buildings, called the "granary of Joseph," still used for the storage of grain. On the island of Rodah, near the town, is the celebrated Nilometer, a rude, graduated column, many centuries old, for indicating the height of the Nile during the annual inundation. From Fostat a canal of irrigation runs through Cairo, and is continued some miles beyond. It is supposed by some to form part of an ancient canal connecting the Nile with the Red sea. From this place also an aqueduct, nearly two miles long and supported by about 300 arches, built by the Arabs, conveys water to the citadel. Cairo is surrounded by walls, though in several parts the houses have extended considerably beyond them. Several of the city gates are elaborately executed. Ophthalmia is very prevalent, and the plague occasionally makes terrible ravages among the population. The manufactures embrace silk and cotton fabrics, gunpowder, glass lamps, sugar, sal ammoniac, leather, weapons, and iron ware. Cairo is a central station of the overland route to India, and its commerce is considerable. The slave traffic has been prohibited throughout the Ottoman empire, in consequence of which the slave markets are closed; but as the slaves themselves have not been emancipated, the trade is still carried on clandestinely. One of the most lucrative trades is that in precious stones and jewelry. The remarkable resources of Cairo make it a favorite resort of Italian, Greek, French, Armenian, and other commercial adventurers, and of intriguers of all nations. It is connected by rail with Alexandria and Suez, and caravans annually arrive from Darfoor, Sennaar, and Moorzook. Every year an immense caravan assembles in the neighborhood of Cairo to make the pilgrimage to Mecca; and as the pilgrims generally carry some goods with them for traffic, their departure and return are to Cairo a considerable source of wealth.

Mehemet Ali established a number of schools after the European fashion, but his plan met with much opposition, and had but indifferent success.—Cairo was founded about A. D. 870 by Johar, a general of El-Moez or Abu Tummim, the chief imam of the N. W. coast of Africa, and representative of the Fatimites. He named it El-Kahireh (the victorious) in commemoration of his conquest of Egypt. This prince made Fostat his capital, but in the 12th century the capital was removed to Cairo. In 1171 the crusaders laid siege to Cairo, but accepted a sum of money and withdrew on the approach of a Syrian army. Saladin improved and enlarged the city, and fortified it with a stone wall in place of the former one of brick. In 1786 the Turks defeated the insurgent Mameluke beys in a battle before Cairo, and took possession of the city, but lost it again in 1790. In that year the plague committed fearful ravages, especially among the lower classes. It was taken by Bonaparte in 1798.

CAIRO, a city of Illinois, capital of Alexander county, built on a low point of land at the junction of the Ohio and Mississippi rivers, forming the southernmost point of the state. 125 m. S. S. E. of St. Louis; pop. in 1860, 2,188; in 1870, 6,267. It is the southern terminus of the Illinois Central railroad, and is connected by ferry with Columbus, Ky., the northern terminus of the Mobile and Ohio railroad. Steamers upon the Ohio and Mississippi make this one of their stopping places. The county buildings are large and handsome; the custom house, of cut stone, cost about \$200,000. One daily, semi-weekly, and three weekly newspapers are published here. For the year ending June 30, 1871, there were enrolled and licensed at this port 17 steamboats with a tonnage of 3,507. Cairo was founded with the expectation that it would become a great commercial city, and large sums of money were expended in improvements by the Illinois Central railroad company, who owned a great part of the land, and had here their workshops. To protect it from inundation, levees were erected, and an embankment 80 ft. wide and 10 ft. high was commenced about 1857. In the summer of 1858 a flood destroyed almost the entire town, which was subsequently restored, and is now amply protected from floods. During the civil war Cairo was an important depot of supplies.

CAISSON (Fr. *caisse*, a case or chest), in architecture, a panel sunk below the surface in soffits or ceilings. In civil engineering, the term is applied, first, to a hollow floating box, usually of iron, which serves to close the entrances of docks and basins; and second, to a box-like structure used in constructing or sinking the foundation of piers under water. Of the latter there are at least three different varieties: the ordinary, the bottomless or open, and the inverted, which includes the pneumatic. 1. The ordinary caisson is a large box with bottom and sides, made of timbers or planks, in which

masonry is built and sunk to its desired position under water. The first caissons of this description of which we have any account were used in laying the foundations of the Westminster bridge, England, in 1788-'40, by Charles Labelye, a Swiss. Frère Romain had in 1685 laid the foundation of the bridge of the Tuileries in what has sometimes been called a caisson, but it answered more nearly to what is now termed a crib, the stones being cramped together with timbers and sunk by the aid of guide piles. Baskets and even barges filled with stones had been sunk at various places; but as the idea of making a tight box in which masonry could be properly laid, and the sinking of it done gradually and under full control, seems to have originated with Labelye, it is mentioned as a new system of laying foundations in deep water. These caissons, of which there were twelve, were oblong and pointed at each end. They were 80 ft. long from point to point, 30 ft. wide, and 18 ft. high. The bottoms were formed of timbers 12 in. square laid lengthwise and close together. Under these were a course of planks 3 in. thick, and over them a course of timber 9 in. square, both laid across the first course and secured to it. The sides were built of fir timbers laid up horizontally on each other and pinned together with oak treenails. All the corners excepting at the ends were framed together, and further secured by three oak knees each; the two points were secured by irons, which were capable of being unfastened, so that the sides could be removed and used for the other caissons. When the masonry was built in these caissons the water inside was controlled by pumps so as to lower the whole gradually to its proper position. De Cessart had just invented a saw for cutting off piles under water, and was about to use it at Saumur on the Loire, when the success of Labelye caused him to change his plans, and he used caissons not only at Saumur, but later at Dieppe, Toulon, and Rouen. Bayeux used caissons at Tours on the Loire in 1755, Bellecour at Lyons on the Saône in 1789, Deschamps at Bordeaux, and Beaupré at Sèvres, besides many other distinguished engineers down to the present time. 2. *Open or bottomless caissons.* Curbs or a species of movable coffer dam have been used of a variety of forms and sizes, and as many of these have been called caissons by the best engineers, they are included under this head. The most prevalent form of these curbs or caissons has been cylindrical, and they have usually been made of iron. The usual method of sinking them has been to lower them down so that they stand vertically on their lower edge; then, by weights or building on flanges, to force them as far as possible into the bed of the stream. When by dredges or pumps the material on the inside has been excavated and the whole gradually lowered till a bed has been reached so impervious as to permit the water to be all removed from the inside, workmen have completed the excavation and filled the interior with masonry or

concrete as desired, the whole forming a portion of the pier. In 1842-'4 the Royal Terrace pier at Milton below Gravesend, England, was so constructed, iron cylinders being used by Mr. Redman. At Peterborough, in 1851, William Cubit sunk cast-iron caissons 6 ft. square. Hawkshaw at Londonderry and at Charing Cross used cylinders of cast iron, which at the latter place were 14 ft. in diameter at the bottom. At Parnitz cylinders 26 ft. in diameter were used, and at the new Victoria bridge cast-iron cylinders of 21 ft. The new Blackfriars bridge piers were each placed on six caissons, four rectangular and two pointed; the rectangular were 86 by 18 ft. At Point du Jour, Paris, large wooden caissons were used. They were also used by Chanute at Kansas City, as large as 70 by 22 ft., and 67 by 80 ft., besides many others similar, in this and other countries. At the dock in Glasgow Mr. Bateman sunk cylinders of brick laid in cement. In India brick cylinders have been very generally used for foundations. In Hungary stone has been substituted, and Mr. Butler proposes Ransome's artificial stone for the same purpose.—The introduction of compressed air as an agent in constructing subaqueous foundations has enlarged the use of caissons, which are inverted and sunk to the bed of the stream, with the open space beneath filled by means of air pumps or compressors with air of sufficient density to expel and keep out the water, and admit of workmen being employed in excavating under them. This method dates back to about the year 1841, when M. Triger, a French engineer, sunk a shaft under the bed of the river Loire to a coal stratum, which made more fully known the capabilities of the method; but it had been fully described and patented ten years before by Lord Cochrane in England, including even the principles of the air lock as now used. The air lock is a small anteroom through which men and materials pass to and from the air chamber with only a moderate loss of compressed air. It is usually an upright closed cylinder of iron made air-tight, having a door opening into it from the outside above, and another door opening from it into the chamber of compressed air below. To obtain access to the air chamber, it is first necessary to enter the lock, close the outer door, and open a cock which permits the compressed air to come in from the chamber and fill the lock until it becomes of the same density, when the lower door can be opened, and entrance is gained to the main chamber, the pressure being transferred to the upper door. In returning, the lower door and the cock are closed, while another cock communicating with the outside is opened, and the air soon becomes rarefied so that the upper door can be opened and the exit made. M. Triger ascertained that by making an aperture through a pipe some distance up from the bottom of the chamber, the current of air thus escaping would carry out a column of water twice as high as was due to the pressure of

air in the chamber. He therefore arranged a cock which served the purpose of ventilation also. In the same year (1841) William Bush patented in England a method of sinking a caisson by excavating within and beneath it in compressed air, the caisson becoming a part of the pier. A sectional view of his caisson is shown in fig. 1, which represents the air chamber A below a second air chamber B B, in which is the air lock C, leading to the air shaft D. The problem of disposing of the excavated material, which is always in such cases a serious one, was solved by using the second air chamber B B as an anteroom or receptacle, it being of considerable size and provided with a door above and below. The small air lock C was for the passage of men without the loss of so much air as the opening of the large lock would occasion, and also to serve as a lock when in process of filling it became desirable to remove the diaphragm or partition between A

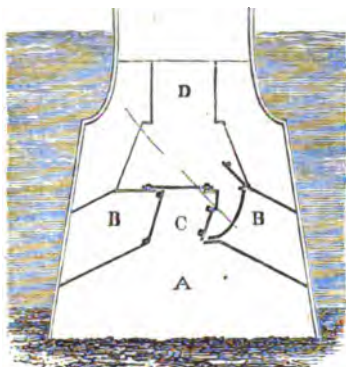


FIG. 1.—Bush's Caisson.

and B B. Dr. Potts about 1847 patented a process of sinking hollow piles by air pressure by exhausting the air within. This was sold to Messrs. Fox and Henderson, who used it successfully at Anglesea with piles that were 12 in. in diameter; it was also used at Windsor and at Huntingdon; but on attempting the same process at Rochester in 1851, with cylinders 7 ft. in diameter, it proved unsuccessful, and the opposite or plenum process which is above described was adopted, and two air locks designed by Mr. Hughes were used. These locks, placed at the top of the air shaft, were D-shaped, and extended into the shaft so that the lower door opened on the side; the earth was raised in buckets and swung into the locks. The same plan was pursued at Chepstow on the Wye. Brunel used the same locks in sinking caissons on the Saltash 37 ft. in diameter; he also used pipes and pumps for removing the water, so as to require less pressure of air. In 1854 Pfannmüller presented a design for a caisson at Mentz on the Rhine, which was to be constructed entirely of iron. It had supply shafts represented about 20 in. in diameter, running through the

top of the caisson, with a door at each end for the purpose of conveying down the materials necessary for filling in the air chamber; it represented the air lock near the air chamber. In 1855 Mr. L. J. Flemming recommended Potts's process to be used on the Great Pedder river; but encountering a log, he with Major Gwynne used the plenum process. He had two pipes, one for air, the other for removing water. In 1857 the same arrangement was used on the Santee river. Similar arrangements were used by Stephenson about the same time on the Nile, where was also used a caisson 28 by 19 ft., which would hold 40 men. In 1857 a caisson was sunk at Szegedin, Hungary, on the Theiss, which had a siphon pump for the removal of water, with a lock extending into the air chamber, as at Chepstow. In 1858 this method was also used near St Germain des Fosses, France, on the Allier. In 1859 the caisson for the Kehl bridge over the Rhine was sunk; it had two shafts with air locks at the top, but provided with doors at the lower end of the shaft, converting the whole into a lock when required. A chain dredge running in a water shaft raised the materials excavated. This work was executed by Castor, who afterward sunk the foundations at Argenteuil. The same year a caisson was sunk at Kovno, Russia, on the Niemen, with two separate air shafts and locks, arranged so that when a bucket passed up one shaft another passed down the other. The same year, also, Gen. William Sooy Smith sunk several cylinders on the Savannah, Ga., in which he made two very important improvements. The first was a spout or trough extending out through the side of the air lock, through which by means of valves and cocks he could send out the material brought up into the lock expeditiously, and with little waste of air. But his most valuable improvement was the method of blowing the sand out through pipes by means of the compressed air. In 1860 the same process was used at Harlem, New York, by W. J. McAlpine. In 1862, at Argenteuil, France, on the Seine, the double locks at the top of the two air shafts were connected with each other by a pipe so as to allow the air escaping from the one to partially fill the other. The caissons at Königsberg, Prussia, on the Pregel, and at Lorient, France, on the Scorff, the former with working chambers 50 by 20 ft., and the latter 39 ft. 6 in. by 11 ft. 5 in., were sunk like that at Kehl; the latter were sunk in 1866 by Desnoyes, as were also those on the Loire near Nantes. About the same time a circular caisson 26 ft. in diameter was sunk at Stettin on the Parnitz, in which a siphon pipe 2½ in. in diameter, with a cock 6 ft. above the bottom, was used for ventilation and removal of water. In 1868 Burmeister and Wain used a removable caisson in excavating for and building piers at Copenhagen. At Perpignan, France, on the Tet, an iron cap with an air lock attached was secured to the top of a cylinder of masonry.

and so carried down. In 1867 Gen. Sooy Smith planned a caisson of an annular elliptical form, with two air locks by which the foundations of the lighthouse at Waughoshance were sunk. The cylinders of the Omaha bridge were sunk in 1868-'9 by Mr. Sickles on Gen. Smith's plan. In 1869-'70 Capt. Eads sunk the foundations of the St. Louis bridge, using very large caissons and going to the great depth of 110 ft. below the surface of the water with one of them. The caisson of the east pier served a twofold purpose, a coffer dam being erected on the top of the inverted lower portion, in which the masonry was built. This caisson was made of iron, of a hexagonal form, with the air chamber under its whole area. The air locks were placed partly within the air chamber, to which access was had both by stairs and an elevator running down the air shafts. The excavation was made by a water siphon designed by Capt. Eads, by which the sand was carried out

by the force of water, which passed down one pipe and returned through another, bringing the sand with it. This is probably the most effective method of removing sand or soft material under such circumstances. Capt. Eads also introduced glass globes in which lights were burned under the normal air pressure, and the smoke conveyed out of the caisson. He practically demonstrated the possibility of carrying down a larger mass of masonry to a greater depth than had ever before been accomplished; and when it is understood that the consequent maximum air pressure was 54 lbs. per square inch within the air chamber, the great hazard of the undertaking may be imagined; but it was entirely successful. Among the many other caissons worthy of note may be mentioned those at Leavenworth by Gen. Smith and Mr. Sickles, at St. Joseph by Col. E. D. Mason, at St. Charles by C. Shaler Smith, all on the Missouri river; while on the

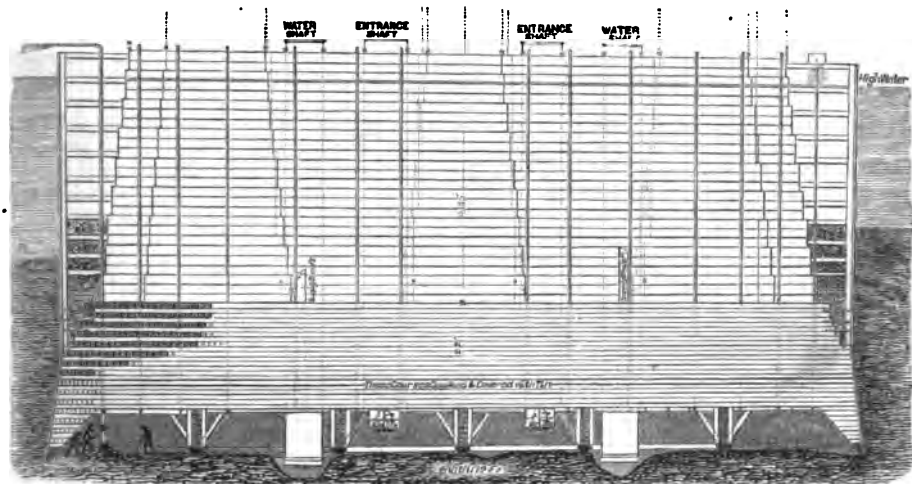


Fig. 2.—Caisson of East River Bridge.

Danube alone may be added those at Steyeregg, Mannshausen, and Nussdorf.—The largest caisson that has ever been sunk was for the New York tower of the East river bridge, by Col. W. A. Roebling, in 1873; and as it embraces a variety of features, a view of the longitudinal section is presented in fig. 2. Its base is rectangular, being 172 ft. long and 102 ft. wide, with an air chamber 9½ ft. high, the roof 22 ft. thick, and the sides carried up to a height of 82 ft. from the extreme lower edge. It was used in a double capacity, having a coffer dam above as well as an air chamber below. It was built of timber and lined with thin boiler iron, the whole held together by angle irons and bolts. It contained 4,200,000 ft. board measure of timber, 235 tons of iron, exclusive of 385 tons of bolts, and weighed when completed 13,271 tons, in which was already laid 30,000 tons of masonry. It had two double air locks

extending into the air chamber, similar to those in the Saint Louis caisson, in which coils of steam pipe were introduced for keeping an equable temperature. Two air shafts extended up through well holes in the masonry, with an elevator in one and a double circular staircase in the other. Two water shafts, each 7 ft. 9 in. in diameter, extended below the level of the edge of the caisson, in which powerful dredges grappled the stones and coarser materials that were deposited beneath them, and raised them to cars above, which conveyed them away; while the sand was blown out by the air pressure, on Gen. Smith's plan, through pipes, of which there were more than 40 in various parts of the caisson. Gas was employed to illuminate the interior, which was forced down into tanks and from thence distributed by pipes below. Communication was constantly kept up with the interior by means of

a mechanical telegraph. Four supply shafts about 2 ft. in diameter, each having doors at top and bottom, with equalizing pipes and cocks, served as the avenues for the introduction of materials for the concrete with which the whole interior was finally filled. This caisson was carried to a depth of 78 ft. from mean high tide, requiring a maximum air pressure of about 84 lbs. above the normal pressure. To supply this immense amount of air, 18 large compressors were provided; the air was conveyed by mains and rubber hose to shafts which communicated with the interior. The sinking was successfully accomplished, as had been that of a caisson nearly as large on the Brooklyn side the year before. (See BRIDGE.)

CAITHNESS, the most northern county of Scotland, bounded N. by the Atlantic ocean and Pentland firth, E. and S. E. by the North sea, and W. by Sutherlandshire; area, 712 sq. m.; pop. in 1871, 89,989, partly of Scandinavian descent. The extreme length is about 58 m.; extreme breadth, 88 m. Two thirds of the surface is flat moorland, devoid of trees, and with scanty vegetation. It rises gradually from the north and east to the ridge of hills on the border of Sutherlandshire, Morven, the highest peak, being 2,384 ft. There are many small lakes in the interior; the Reay, Thurso, and Wick are the principal streams. The climate is not severely cold, but in winter the storms are violent. The soil is light and sandy, but much of it is tolerably productive. The principal crops are oats, beans, flax, and potatoes. The fisheries are important, herring, cod, and ling being obtained in abundance off the coast; salmon abound in the streams, and trout in the inland lakes. The county is divided into 18 parishes, and returns a member to parliament. It gives the title of earl to the Sinclair family, and contains the castles of several noblemen. The principal town is Wick, on the E. coast, which has a commodious harbor and considerable trade.

CAIUS. I. A Roman general, son of Marcus Agrippa and Julia, the daughter of Augustus Caesar. He was adopted by Augustus, served under Tiberius in Germany, and was sent as proconsul against the Arabians, Armenians, and Parthians. He reduced Armenia and routed Tigranes. He was treacherously wounded at a private interview with an enemy, and died from the effects. II. A Christian theologian and bishop of the 3d century. His origin is uncertain, but he was a disciple of St. Irenæus. He had a conference with Proclus, the leader of the Montanists, the result of which he published in the form of a dialogue, and in 210 was appointed a bishop to the heathen in foreign parts. He regarded the epistle of St. Paul to the Hebrews as apocryphal, and was the first who wrote against Cerinthus and the Millenarians. His last work was one aimed at those who asserted that Jesus Christ was only a man. III. A saint and bishop of Rome, a native of Dalmatia, and a relative of the empe-

ror Diocletian, succeeded Eutychian Dec. 14, 283, and died April 21, 296. At the time of the first persecution of the Christians by Diocletian, he was forced to find safety in an obscure retreat.

CAIUS, John, an English physician, founder of Caius college, Cambridge university, born at Norwich, Oct. 6, 1510, died in Cambridge, July 29, 1573. His name was Kaye or Ker, which he Latinized into Caius. He took his degrees at and became a fellow of Gonville hall, Cambridge, and distinguished himself at the age of 20 by translating Chrysostom's "Method of Praying to God" and Erasmus "On True Theology." He spent some time in traveling on the continent, studied medicine at Padua, and in 1541 took his doctor's degree at Bologna. He returned to England in 1544, and practised at Cambridge, Shrewsbury, and Norwich. Henry VIII. appointed him lecturer on anatomy to the company of surgeons, London. In 1547 he became fellow of the college of physicians, and court physician to Edward VI., which appointment he retained under Mary and Elizabeth. He was elected president of the college of physicians for seven years in succession. There is extant a book of the college annals from 1555 to 1573 written by him in Latin. He obtained permission from Queen Mary to endow and raise Gonville hall into a college, which still bears his name (Gonville and Caius college), and accepted the mastership thereof. Toward the close of his life, however, he resigned this office, but remained at the college as a simple fellow commoner until his death. His works are numerous on scientific, philological, and historical subjects. The most noted of them was "A Booke or Counsell against the disease commonly called the Sueate or Sueatyng Sicknesse."

CAJAMARCA (formerly CAXAMARCA). I. A N. department of Peru, bounded by the departments of Amazonas, Piura, Loreto, Ancachs, and Libertad; area, about 14,000 sq. m.; pop. 275,000, including many mestizos and Indians, many of the latter being descendants of the Incas. The plain of Cajamarca, which bears a strong resemblance to that of Bogotá, and like it was probably once the bed of a lake, is one of the most fertile in South America. The wheat harvest in the pampa is from 15 to 20 fold; but it is sometimes blighted by night frosts. Small mounds or hillocks of porphyry, once perhaps islands in the lake, are studded over the northern part of the plain, and break the wide expanse of smooth sandstone. Agriculture, cattle raising, the manufacture of coarse woollen, linen, and cotton fabrics, and washing for gold, constitute the chief occupations of the inhabitants. The department is divided into the provinces of Cajamarca, Cajabamba, Celendin, Chota, Jaen, Hualgayoc, and Contumazá. II. A city, capital of the department and province, on a river of the same name, in the valley of Cajamarca, 365 m. N. N. W. of Lima; pop. about 20,000. The ori-

ginal name of this city, the scene of the arrest, captivity, and judicial murder of the Inca Atahualpa in 1533, was Casamarca, "city of frost." It lies at an elevation equal to that of Quito; but being sheltered by the surrounding mountains, its climate is mild and agreeable. In every direction in the vicinity are seen cultivated fields and gardens intersected by avenues of willows, varieties of the datura, bearing red, white, and yellow flowers, mimosas, and beautiful quinquar trees. The streets are wide and regular, and the houses, for the most part of mud and whitewashed, present a lively and pleasing aspect. The appearance of the churches, nearly all of cut stone of enormous dimensions, and embellished with spires and cupolas, is unusually imposing. A considerable trade is carried on with some of the seaports, especially Trujillo, and a railway now in process of construction (1873) will shortly connect Cajamarca with the port of Pacasmayo. Woollen, linen, and cotton goods, sword blades, daggers, and other articles of steel and of the precious metals, form the most important industry of the inhabitants. Near the city stand the remains of the ancient residence of Atahualpa, surrounded by fruit gardens and irrigated fields of lucerne; while in the distance are seen columns of smoke rising from the warm sulphur springs of Pultamarca, still called *Baños del Inca*, the Inca's baths. Some portions of the Inca's palace in the city, situated on a hill of porphyry, and originally hollowed out of the solid rock, have been converted into a jail and a town hall. The room in which Atahualpa was confined for nine months is still pointed out. The custom of burying treasure was common among the ancient Peruvians, and subterranean chambers still exist beneath many private dwellings in Cajamarca.

CAJATAMBO, an inland town of Peru, capital of a province of the same name in the department of Junin, 140 m. N. N. E. of Lima; pop. about 3,200. It is situated in the midst of a fertile plain at the foot of the Andes, watered by a branch of the river Barranca. The inhabitants are mostly employed in spinning woollen yarn for export to Lima.—The province (area, 1,500 sq. m.; pop. 24,750) is for the most part mountainous and barren, with a rigorous climate, but contains the remains of numerous ancient towns and aqueducts. It has considerable trade in wool, salt, sulphur, and vitriol.

CAJAZZO, or *Calazzo* (anc. *Calatia*), a town of S. Italy, in the province of Caserta, 11 m. N. E. of Capua, near the Volturno; pop. about 6,500. It is defended by a castle built by the Lombards. There are ancient inscriptions, remains of massive walls, and an ancient cistern which still supplies the town with water.

CAJEPUT OIL, a volatile oil, distilled from the leaves of a small myrtaceous tree or shrub, found alone in the island of Booro in the Malay archipelago, a species of *melaleuca* named

the *cajuputi*, though possibly it is the *M. minor* of De Candolle. The name is a corruption of the Malay designation of the oil, *minyak kayu-putih*, "white wood oil," the latter words being written by the Dutch *cajoeputi*. The whiteness of the bark of the tree is the cause of the name given to the oil. It is in high repute, not only as a liniment, but as an internal remedy, among the different peoples of the archipelago, especially the Javanese. A few Chinese and Javanese traders of Batavia are the sole factors of the trade in cajeput. The leaves are gathered on a dry hot day, and being steeped in water they commence fermenting, and are then distilled. The quantity of oil obtained is small, and being extensively used by the Malays, it commands a very high price. It is imported in glass bottles, and as received is commonly of a fine green color, which has been attributed to the copper ves-



Cajeput (*Melaleuca cajuputi*).

sels in which it is prepared. Copper has indeed been detected in some samples of it; but not always being found, the color is supposed by some to be the natural color of the oil, derived from the greenish principle or chlorophyll of the leaves. Whatever may be the cause, the color disappears on rectifying the oil. It is then a very thin fluid, transparent, of a warm, pungent taste, and an odor like that of camphor and turpentine mixed. It is soluble in alcohol, but only partially in water, burns readily without residue, and is of specific gravity 0.914 to 0.927. It is often adulterated with oil of turpentine and camphor, or oil of rosemary. It is used in medicine for its highly stimulant quality, either as an external application mixed with the same quantity of olive oil for gouty and rheumatic pains, or taken internally in cases of chronic rheumatism and spasmodic affections of the bowels. Some have highly recommended its use in cholera. It is introduced into the cavities of aching teeth, to relieve the pain.

CAJETAN, or *Cajetanus* (Ital. GAETANO). I. *Benedetto*. See BONIFACE VIII. II. *Tommaso de Vio*, an Italian cardinal, born at Gaeta, Feb. 20, 1469, died in Rome, Aug. 9, 1534. He entered the order of Dominican friars, studied philosophy and theology at Naples and Bologna, and in 1508 was elected general of his order. When Pope Julius II. was summoned to appear before the council of cardinals at Pisa and afterward at Milan, Cajetan undertook his defence, maintaining that the power of convening a council belonged solely to the pope. In 1517 he was sent by Leo X. as papal legate to Germany, to induce the emperor Maximilian to join the league against the Turks, and especially to bring the Lutherans back to their allegiance to the papal see. His haughty manner defeated the purpose of his mission. In 1519 he attended the assembly of the German electors at which Charles V. was chosen emperor, and contributed much to this choice. In the same year he was appointed to the see of Gaeta, and afterward filled several important missions, among which, in 1523, was that of legate to Hungary, then invaded by the Turks. At the capture of Rome by the imperialists in 1527, he was made prisoner, and had to pay a ransom of 5,000 crowns. He wrote several works, all of which, though somewhat modified, were published at Lyons in 1639. Among these are a translation, with commentary, of the Old Testament in 5 vols. fol.; commentaries on Thomas Aquinas; and *Opuscula*, containing his treatise on the authority of the pope, of which a refutation was published by order of the faculty of the university of Paris. III. *Enrico*, properly *SERMANETO*, an Italian cardinal, died in Rome in 1599. He was made cardinal in 1585, and in 1589 was sent by Pope Sixtus V. as legate to France, to bring about the election of a Catholic king; he took part with the league, and was active in the intrigues of the time. He was recalled by the pope, but was afterward employed in important affairs. He was the author of several political and theological works.

CALABAR, an undefined portion of the coast of Upper Guinea, on the bight of Biafra, about lat. 5° N., lon. 8° E. It is low and swampy, only a small portion being fit for cultivation. Two thirds of the inhabitants are slaves. There is some commerce in palm oil, chiefly with British traders. The principal towns are Duke Town and Creek Town; pop. of each, 6,000 to 7,000. Old Calabar river, the principal stream on this part of the coast, crosses this district. New Calabar river is about 80 m. further W., and forms one of the outlets of the Niger, flowing into the same estuary with the Bonny. The town of New Calabar is on an island in the river, about 20 m. above its mouth. It has some traffic in slaves, ivory, and palm oil, for which it receives European goods.

CALABAR BEAN, the fruit of *physostigma venenosum* (Gr. *phōa*, bellows, and *otrypa*, a prick), a climbing plant of the family legumi-

nosa, which grows by the river sides in western Africa. The leaves, which are more than an inch long, three quarters of an inch in width, and of a brownish red or ash-gray color, are used by the natives to determine the guilt or innocence of persons suspected of crime, and have thence received the name of ordeal bean. The quantity used for this purpose is said to be generally fatal unless vomiting is produced. Of 70 cases of children in Liverpool who ate of the beans, the only one who died was the only one who did not vomit either from the drug itself or from emetics. Some of the symptoms produced by a small dose are difficulty of breathing, palpitation, depression, muscular weakness, and indistinctness of vision. After larger doses vomiting is likely to take place; when it does not, the symptoms increase until death; speech becomes difficult, but the mind remains clear. Some of its most important effects are upon the eye, the pupil being



Calabar Bean (*Physostigma venenosum*).

strongly contracted, and the accommodation so disturbed that distant objects are not seen until the near point is approximated, being in this respect almost the exact opposite of belladonna. The same effects are observed after local application. Its action, according to Dr. Fraser's experiments, is that of a powerful sedative to the spinal cord and cardiac ganglia. It has been as yet chiefly employed in ophthalmic practice, but has been recommended as an antidote to strychnia, and in tetanus and chorea. In some cases of tetanus it has been apparently successful. It may be administered either by the mouth or rectum, or subcutaneously, the dose being regulated by the effect produced.

CALABASH TREE (*crecencia cujete*), a native of the West Indies and the continent of America. It grows to about the height and bulk of an apple tree, with crooked horizontal branches, has wedge-shaped leaves, pale white flow-

ers on the trunk and branches, and a roundish fruit, from a few inches to a foot in diameter. The calabash fruit contains a pale yellow, juicy pulp, of an unpleasant taste, which is deemed a valuable remedy in several disorders, both internal and external. The uses to which the fruit of the calabash tree is applied are very numerous. It is covered with a greenish-yellow skin, enclosing a thin, hard, and almost woody shell, which is employed in lieu of various kinds of domestic utensils, such as bowls, cups, and goblets of every description. These shells are so hard and cross grained that when filled with any fluid, they may sometimes be



Calabash—Leaves, Flower, and Fruit.

put on the fire and used as kettles. They are also cut and carved, variously stained, and polished, as ornamental vessels.

CALABOZO, a town of Venezuela, in the province and 120 m. S. S. W. of Carácas, situated in the *llanos*, or plains, W. of the river Guárico, between the Apure and the Sierra Costanera; pop. about 6,000. It was founded by the *Compañía Guipuzcoana* in the beginning of the 18th century, and is in appearance very picturesque. The heat is extreme (average 88° F.), but is at times tempered by breezes from the N. E. In the rainy season it is subject to great inundations, which often interrupt communication. The houses are well built and the streets are regular. There are several schools and a college. Its situation makes it an important centre of commerce. The exports consist of sugar and horned cattle. Cattle-rearing is extensively carried on in the surrounding country. There are thermal springs in the neighborhood, surrounded by a beautiful grove.

CALABRESE, IL. See PRETI, MATTIA.

CALABRIA, the southern part of Italy, extending from the province of Potenza (Basilicata) to the strait of Messina, between lat. 37° 53' and 40° 8' N., and lon. 15° 40' and 17° 10' E.; area, 6,668 sq. m.; pop. in 1872, 1,806,104. It is divided into the provinces of Cosenza (Ca-

labria Citeriore), Reggio (Calabria Ulteriore), and Catanzaro (Calabria Ulteriore II.). The Apennines run southward through Calabria, with numerous spurs stretching toward both seas, and covering a great part of the country. A branch extending 35 m. in length from W. to E., and 25 m. in breadth from N. to S., forms the Silese mountains in the central and widest part of Calabria; and further S. the Aspromonte range fills nearly the whole width of the S. part of the province of Reggio. The highest peak of the Calabrian Apennines is Monte Pollino, about 7,500 ft., with which the chain begins near the borders of Potenza. The mountain streams, which are numerous, discharge into both seas; the larger rivers are the Sinno, Crati, and Neto in northern and central Calabria, and there are many small lakes near the E. coast. Between the mountain masses and their spurs are some extensive valleys, generally on the banks of the larger rivers and terminating in plains near the coast. Among these the largest and most fertile are the valleys of Cosenza and Monteleone and the plain of Gioja. The principal products of Calabria are corn, rice, olive oil, licorice, oranges, lemons, honey, silk, sugar, saffron, flax, cotton, tobacco, medicinal plants, and dyes. The sides of the mountains are covered with oak, elm, cedar, chestnut, cypress, olive, fir, and pine trees. There are veins of gold, silver, copper, marble, and alabaster, and abundant deposits of pure rock salt and sulphur. Calabria has a fine breed of horses, and sheep, cattle, and swine are abundant. Bees are very numerous, and silkworms are extensively raised; but the silk, though of a good quality, is of a dark color, as the worms are fed on the red mulberry. Considerable silk is manufactured in the province of Catanzaro. In the southeast there are iron furnaces supplied with ore from the mines of Lo Stilo, just within the boundaries of Reggio. The fisheries afford employment to many of the inhabitants of the towns on the coast, and immense quantities of anchovy, mullet, tunny, and sword fish are taken. The Calabrians are hardy and brave, but are irritable and passionate. The robberies and murders for which Calabria was formerly distinguished have much diminished within a few years. The dialect of the people is similar to that of Sicily. The country is subject to violent storms and earthquakes. The earthquake of 1783 destroyed more than 40,000 Calabrians and Sicilians, and a shock on Oct. 6, 1870, swallowed up several villages.—In ancient times Calabria formed the territory of Bruttium and the southern part of Lucania. (See BRUTTIUM and LUCANIA.) In the middle ages it formed a part of the kingdom of the Ostrogoths under Theodoric, A. D. 493, and in 536 was conquered for the Eastern empire by Belisarius. It subsequently fell into the hands of the Saracens, from whom it was wrested in 1058 by Robert Guiscard, who took the title of duke of Apulia and Calabria. Under his

descendants it became a part of the kingdom of Naples, and so remained until the consolidation of the kingdom of Italy in 1860.—For ancient Calabria (now Terra d'Otranto) see APULIA, and MESSAPIA.

CALADIUM, a genus of plants of the order *araceæ* or *aroidæ*. Spathes convolute, straight; spadix with hermaphrodite flowers, rudimentary below and with sterile appendix; anthers many, 1-celled, opening at the apex by a pore; ovaries many, crowded, free; bicelled, 2-4 ovules in each cell, which are ascending and orthotropous; stigmas terminal, sessile; berries 1-2-celled, few-seeded; seeds angular, with coriaceous testa. Plants with large fleshy rhizome, peltate leaves, and fragrant flowers. The genus is found in the tropical regions of America, but has been introduced elsewhere, so that some species are found throughout the Pacific islands and in tropical Asia and Africa. As an ornamental plant



Caladium esculentum.

many species of caladium are cultivated under glass, and are distinguished by their beautiful mottled or variegated leaves. The leaves of some species attain a great size and form a characteristic feature of the landscape in tropical swamps. The rhizoma of *C. (colocasiun) esculentum* is a very important article of food. It is cultivated in shallow ponds or tanks, the bottom being carefully dug over and worked to the depth of one or two feet; in this the sprouts or the bases of the leaves are planted, and a few inches of water let on. The sprouts are set 12 or 18 inches apart according to the variety, and as they grow the depth of water is increased. In a year the crop is ready for use. As the patch is cleared new sprouts are planted, and the whole is seldom cleared oftener than once in six years. The rhizoma is roasted and pounded with water to make the paste called by the Hawaiians and other Pacific islanders *poi*, which

forms their main food. It contains much starch, and is very nutritious. The leaf stems are also boiled and eaten.

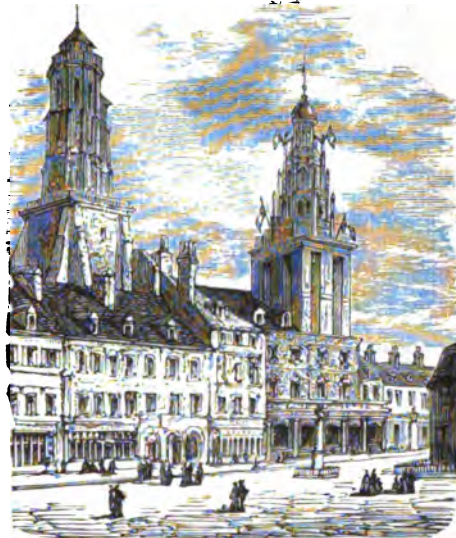
CALAHORRA (anc. *Calagurris*), a town of Old Castile, Spain, in the province and 20 m. S. E. of Logroño, on the river Cidacos near its junction with the Ebro; pop. in 1867, 7,104. It is old and decayed in appearance, and its houses are generally mean; its cathedral, in the mixed Gothic style, and an episcopal palace, are alone worthy of note. Calahorra is memorable as the birthplace of Quintilian, St. Dominic, and Prudentius, the first Christian poet, and for its desperate but unsuccessful resistance to a Roman siege in 71 B. C. The remains of Roman towers and an aqueduct may still be traced. The celebrated warm baths of Amedillo are within a short distance of Calahorra.

CALAIS, a city and one of the capitals of Washington county, Maine, at the head of tide water on the St. Croix river, 15 m. from Passamaquoddy bay, opposite St. Stephen, New Brunswick, and 75 m. E. by N. of Bangor; pop. in 1870, 5,944. Five bridges span the river at this point. The St. Croix and Penobscot railroad, completed to Princeton, 22 m. will connect with the European and North American line, forming a continuous route to Bangor. A branch of the New Brunswick and Canada railroad terminates at St. Stephen. The tide rises at Calais from 20 to 26 feet. Lines of steamers ply to St. John on the east and Portland and Boston on the west. The water power is of a superior character, the large lakes at the head of the river acting as reservoirs during the dry season, and preventing sudden rises by freshets. The chief industry is the manufacture and trade in lumber, which is obtained from the extensive forests on the upper St. Croix. The arrivals of vessels in the year 1872 numbered 1,195, and the departures 1,196. The exports of long lumber from the river in that year were over 100,000,000 ft., of which about 30,000,000 went to foreign parts. The exports of short lumber were 82,000,000 laths, 40,000,000 shingles, 1,500,000 pickets, 353,000 ft. of spool stuff, 160,000 hoops, 150,000 broom handles, 110,000 clapboards, 75,000 railroad ties, 51,000 ship knees, and 12,000 spruce poles. The machinery for sawing lumber is propelled exclusively by water power, and consists of 63 mills and 40 lath and shingle machines. Nearly all the mills contain gangs of saws, each gang containing 16 movable upright saws in a single frame, the whole having a capacity of production equal to 1,000,000 superficial feet of sawed lumber per day. Ship building is also an important branch of industry. From 10 to 15 vessels are built annually. The city owns 10,000 tons of shipping. It also has a large steam mill for the manufacture of doors, windows, and all kinds of planed lumber, a steam flour mill, an establishment for grinding and calcining plaster of Paris, 2 iron foundries, 2 machine shops, 2 axe manufactories, a dry dock, 2 marine railways, several

flour mills, and a number of small establishments for various kinds of wood manufacture. On the head waters of the St. Croix several large tanneries have been recently built at a cost of nearly \$1,000,000. The city contains a national bank with a capital of \$100,000, and a savings bank with deposits in 1870 amounting to \$87,882 39. The valuation of estates in 1870 was \$1,523,452. There are 16 school houses, and the city is divided into 9 school districts, 2 of which have graded schools, each containing 4 grades; average attendance, about 1,200. In 1870, \$10,000 were raised for school purposes. The city contains a large city hall, an opera house, 2 weekly newspapers, 8 post offices, 4 hotels, and 10 churches. The government is administered by a mayor and 5 aldermen (one for each ward).—Within the city limits, at the mouth of the river, lies St. Croix or Big island, on which Pierre du Gast, sieur de Monta, wintered in 1604-'5, on the voyage in which he founded Port Royal in Nova Scotia, the first permanent French settlement in America. Calais was organized as a town in 1809, and incorporated as a city in 1850. In August, 1870, a large part of the city was consumed by fire, about 40 acres of the most thickly settled portion being burned over, together with 15 wharves and about 20 vessels. It has been entirely rebuilt with larger and more commodious structures, and in the business portion largely of brick and stone.

CALAIS, a seaport town of France, in the department of Pas-de-Calais, on the strait of Dover, 19 m. N. N. E. of Boulogne, and 150 N. of Paris; pop. in 1866, 12,727. It is situated in a barren district, and is fortified by a citadel and several forts. The harbor, formed by two long wooden piers, is shallow. There is a lighthouse 190 ft. high near the outer ramparts. Steamers ply daily across the strait to Dover, with which it is connected by a submarine telegraph. It is entered from the sea through a drawbridge and gate erected by Cardinal Richelieu in 1635. The streets are broad and well paved, and the houses neat in appearance, mostly of stone and brick. The ramparts afford a pleasant promenade. English is very generally spoken. The noteworthy buildings are the church of Notre Dame, built during the English occupation, and containing Vandyke's famous painting of the Assumption; the hôtel de ville, containing the public offices, and surmounted by a belfry with chimes; and the hôtel de Guise, established by Edward III. for the wool staplers' guild. In front of the hôtel de ville are busts of Eustace de St. Pierre, Francis duke of Guise, and Cardinal Richelieu; behind it is la tour du Guet, which dates from 1214, and was formerly used as a lighthouse. Calais has manufactures of tulle, gloves, and hats, and exports wine, brandy, and eggs. Carriages are a considerable article of trade, and ship building and fisheries are important branches of industry.—Prior to the 10th cen-

tury Calais was an insignificant fishing village, but it was greatly improved in 997 by Baldwin IV., count of Flanders, and enlarged and strengthened by Philip of France, count of



The Place d'Armes, with the Hôtel de Ville and Lighthouse.

Boulogne, in the early part of the 13th century. It was taken by the English under Edward III. in 1347, after a long siege, Eustace de St. Pierre and five companions being accepted as a ransom for the whole population, and being themselves spared at the intercession of Queen Philippa. It was retaken by the French under the duke of Guise in 1558, and since that time has remained in their hands except for two years (1596-'8), when it was held by the Spaniards. Charles II. of England lived there for some time in 1659, and James II. mustered his forces there for the invasion of Ireland. The spot at which Louis XVIII. landed, April 24, 1814, after his exile, is marked by a column with an inscription commemorating the event.

CALAMANDER WOOD, a hard and beautiful wood imported from Ceylon. It is taken from the heart of the *diospyros hirsuta*, a species of the genus of trees which produces ebony. It has a great variety of color, the prevailing shade being a delicate chocolate, and is adapted to ornamental work, as it takes a fine polish. It is very scarce and costly. The name is believed to be a corruption of Coromandel wood.

CALAMATTA, Luigi, an Italian engraver, born at Civita Vecchia in 1802, died in Milan, March 8, 1869. He early went to Paris, and became famous in 1834 by his engraving of a head of Napoleon, taken at St. Helena after his death, and of Ary Scheffer's Francesca da Rimini. At the Paris exhibitions of 1855 and 1867 were shown many of his works, including etchings after paintings by Leonardo da Vinci,

Raphael, Guido Reni, and of Rubens's portrait of himself. His remains were transferred to Nohant, the country residence of Madame George Sand. His wife, JOSÉPHINE, excels as a painter of religious subjects.

CALAMBUCO, a valuable timber tree, found only in the northern provinces of the island of Luzon. For ship building it is esteemed superior to live oak or teak. It resembles the latter when dressed, has the same dark unctuous appearance, and like it is never attacked by the destructive white ant of the Malay archipelago. Vessels built of it are said to be seaworthy for 50 years. A great variety of agricultural, mechanical, and warlike instruments are made from this wood.—This name is also given to a tree which produces the odoriferous agila or eagle wood and aloe wood of commerce. It is found chiefly in Siam, the Malay peninsula, and in the northern portion of Sumatra; but it is also found in the Indian peninsula, where it is called *agharu*, and hence it is sometimes named by the Malays *kayugharu*. The perfumed wood is supposed to be a diseased tumor in the tree, arising from the wound of a timber worm. The thickened, resinous sap formed in these tumors is used as an incense in all eastern countries. There is much discrepancy in the statements relative to the tree yielding the genuine agila, and this perfume and aloe wood have been supposed to be the products of different trees; but it is the heart of the *kayukalambak*, or calamenco tree, which produces the aloe wood, and in the bark the agila is formed. The agila does not yield its aroma until burned; but the calamenco or aloe diffuses its fragrance when rubbed in the hands.

CALAME, Alexandre, a Swiss painter, born at Vevay, May 28, 1810, died at Mentone, March 19, 1864. He early lost his father, but through the assistance of the banker Diodati he was enabled to study at Geneva under Diday, whom he eventually succeeded as principal of the school of painting in that city. He explored picturesque sites in Switzerland and France, and produced between 1838 and 1844 many pictures of Alpine scenery, among the best of which are the passes of Monte Rosa and Mont Cervin, the "Storm in a Forest," and the "Lake of the Four Cantons." In 1845 he went to Italy; and his best pictures of Italian scenery represent the ruins of Paestum. He also produced many fine engravings. He spent the latter part of his life in Geneva.

CALAMIANES, a group of islands of the Philippine archipelago, intersected by lat. 12° N., lon. 120° E. It consists of the large islands Busvagon, Calamian, Linacapan, Coron, Dumarang, Yloe, Lutaya, Carandaga, and about 240 unimportant islands and islets. This group and the northern portion of the island of Palawan, called Paragua, constitute the province of Calamianes, the poorest and least populous of the Spanish Philippines. Area, about 2,300 sq. m.; pop. about 20,000. The inhabitants of the group and of the Spanish portion of Palawan

are of the Bisaya race, and have been converted to Christianity by the Spanish missionaries. There is a Spanish settlement and residence of an alcalde on Calamian. The colonists are engaged chiefly in pearl fisheries.

CALAMINE, a name given to two different ores of zinc, the silicate and the carbonate. The most common ore worked for zinc is the anhydrous carbonate. It occurs crystallized in rhomboidal forms, of vitreous lustre, and a little pearly, of white, yellowish gray, or brown color, semi-transparent or opaque, in forms botryoidal, stalactitic, and reniform, and in crystalline incrustations; hardness 5, specific gravity 4 to 4.45. It contains oxide of zinc 64.51, and carbonic acid 35.19. It dissolves with effervescence in acids, and is also soluble in ammonia moderately heated. It occurs in thick beds and irregular masses, among calcareous rocks of the secondary and metamorphic formations. It is rarely found unmixed with oxide of iron and the silicate of zinc. It is extensively worked for the production of zinc paint at Vieille Montagne, between Liège and Ailla-Chapelle. In this country it is found associated with hematite iron ores, and also with the sulphuret of lead or galena. It is worked near Bethlehem, Lehigh co., Penn., and in the vicinity of Lancaster. In Dana's "Mineralogy" it is called smithsonite. The hydrous silicate of zinc, also called electric calamine, often accompanies the anhydrous carbonate, and it is usually the two minerals mixed which are designated by the name of calamine. It occurs in forms similar to those of the carbonate, and in crystals derived from a rhomboidal prism. Its hardness is 4.5, or when crystallized, 5; its specific gravity from 3.16 to 3.49. It dissolves by the aid of heat in sulphuric or muriatic acid, and gelatinizes on cooling. It becomes strongly electric by heat, to which property it owes its name. Its composition is, silica 25.1, oxide of zinc 67.4, and water 7.5.—In pharmacy, the term calamine is applied only to the native carbonate, which has always been employed in an impure state. It is often sold, too, of a spurious quality, consisting principally of sulphate of baryta and carbonate of lime, with mere traces of zinc. It is said that the miners in England recognize two kinds of calamine: one, which they call brass calamine, is sold to the makers of brass; and the other, baryta calamine, which is the amorphous sulphate of baryta, is sold to the druggists for native carbonate of zinc. In medical preparations calamine is heated to redness, and reduced to an impalpable powder. By this calcination it is converted into oxide of zinc, mixed with the impurities of the ore. In this state it is called prepared calamine. It is used as an external application only, sometimes in the form of cerate, but more commonly it is dusted upon ulcerated and excoriated parts, upon which it acts as a mild astringent and exsiccant. In consequence of the impurities of this article, carbonate of zinc obtained by pre-

cupitation is substituted for it in the "United States Pharmacopœia."

CALAMIS, a Greek statuary, who flourished between 467 and 429 B. C. He made statues in marble, bronze, gold, and ivory. Among those mentioned by ancient writers are one in marble of Apollo, which some have erroneously supposed to be the Apollo Belvedere; a bronze Apollo Alexicacos, at Athens; another Apollo in marble in the Servilian gardens in Rome; a colossal bronze Apollo, carried to Rome by Lucullus from Apollonia in Illyria; a Jupiter Ammon consecrated at Thebes by Pindar. He was also famous for his representations of horses, and as an embosser.

CALAMITES, extinct species of fossil plants, originally classed by most botanists as cryptogamous, being regarded as gigantic *equiseta*. The horsetail of our marshes is a slender herbaceous plant, with a hollow stem and rarely more than two feet high; while the calamites of the carboniferous marshes had partly woody



Calamites.

trunks, and some were 20 feet or more in height. Of the genus *calamites* about 50 carboniferous species have been described, only three or four triassic, two Jurassic, and none of later periods. Adolphe Brongniart has shown in his *Genres de végétaux fossiles* (1849) that many calamites cannot belong to the *equiseta*, nor probably to any tribe of flowerless plants. He conceives that they are more nearly allied to the gymnospermous dicotyledons. Prof. Williamson, on the contrary, thinks that in the arrangement of their tissues they differ widely from all known forms of gymnosperms. These remarkable plants unfortunately possessed very delicate tissues, so that perfect specimens are extremely rare, and hence the uncertainty respecting them.

CALAMUS (Gr. κάλαμος). I. A sort of reed, which the ancients used as a pen for writing on parchment or papyrus. Those which came from Egypt and Onidus were the most es-

teemed. When the calamus became blunt, it was sharpened with a knife. It was split into two nibs, like our modern pens. It is still used in the East, a quill or metallic pen not



Sweet Flag (*Acorus calamus*, or *Calamus aromaticus*).

being adapted for producing the flowing characters of the Arabic and similar alphabets. The reed from which these pens are made is about three quarters of an inch in circumference. This instrument must not be confounded with the *stilus*, which was only used for writing on wax tablets. II. In the pastoral poets of antiquity, a pipe of reed, in construction probably resembling a fife or flageolet. III. In modern botany, a genus of palms furnishing the rattan canes of commerce. (See RATTAN.) IV. The sweet flag (*acorus calamus*), growing in swamps, ponds, and on the banks of rivers in England and in the cooler parts of Europe, the East Indies, and America. The thick stem sends up several lance-shaped leaves 2 or 3 ft. long, which when bruised are aromatic, and hence were formerly strewed as rushes in the cathedrals. The rhizome has a strong, aromatic, slightly acrid taste, and is used in medical practice as a stimulant, especially in some kinds of indigestion, by confectioners for candy, and by perfumers in preparing aromatic vinegar and some other articles.

CALAMY. I. Edmund, an English clergyman, born in London in February, 1600, died there, Oct. 29, 1666. He was educated at Pembroke hall, Cambridge, where he failed to gain a fellowship in consequence of his opposition to the doctrines of Arminius. He was appointed by the bishop of Ely to a vicarage, became lecturer at Bury St. Edmund's, and in 1639 minister of St. Mary's, Aldermanbury, having left the established church in consequence of the promulgation of the Scottish liturgy and the "Book of Sports." Although a nonconformist, he opposed the execution of Charles I., and in 1660 was one of the deputies sent to Holland

to congratulate Charles II. on his restoration. He was made chaplain to Charles II., and was offered the bishopric of Lichfield, which he declined. Upon the passage of the act of uniformity in 1662, he resigned his living, and was committed to Newgate. He declined to form a congregation, but remained a worshipper in the church of which he had been minister. He was one of the authors of "Smectymnus," a reply to Bishop Hall's "Divine Right of Episcopacy," and published "The Godly Man's Ark" (17th ed., 12mo, London, 1698), "The Noble-man's Pattern" (4to, London, 1648), and many sermons. **II. Edmund, D. D.**, an English clergyman, grandson of the preceding, born in London, April 5, 1671, died June 8, 1782. He was educated at the university of Utrecht, and in 1691 was offered a professorship in the university of Edinburgh, which he declined. He began to preach as a non-conformist, and in 1708 took charge of a congregation in Westminster. He arranged for the press "Baxter's Life and Times" (1708), and published "Defence of Moderate Nonconformity" (8 vols., London, 1708-'5), "The Nonconformists' Memorial" (2 vols., 1721), and several volumes of sermons. A "History of his Life and Times," edited by Rutt, has been published (2 vols., London, 1829).

CALANCHA, Frey Antonio de la, a Peruvian writer, born at Chuquisaca toward the end of the 16th century, died near the middle of the 17th. He was a member of an Augustinian convent at Lima, and in 1619 prior of his order at Truxillo. He wrote a book on Peru, which was published at Barcelona in 1689, under the title of *Crónica moralizada del orden de San Agustín en el Perú*. In 1658 an abridged French edition of this work appeared at Toulouse, under the title of *Histoire de l'Eglise du Pérou*.

CALAND, or Kaland, a religious brotherhood dating from the 13th century, consisting of Roman Catholic priests and laymen, devoted to charitable and devotional labors. It was confirmed by the local bishops, though not by the pope, and acquired considerable corporate influence and property, mainly in N. Germany, but to some extent in Switzerland, France, Hungary, and probably in Sweden. Many of the brotherhood held licenses for breweries, and their beer-drinking degenerated in the 15th and 16th centuries into orgies; and the reputation of the order sank so low that it was dissolved previous to the reformation, its property being appropriated to public uses.

CALAS, Jean, a French Protestant, born in 1698, executed at Toulouse, March 9, 1762. He was a merchant of Toulouse, his wife an English woman of French extraction. One evening in October, 1761, after the family had retired from supper, his eldest son, Marc Antoine, a young man addicted to gambling, and of a gloomy disposition, was found dead at the entrance to his father's warehouse. Besides the members of Calas's family, there was at the time no person in his house excepting M.

Lavaysse, a young gentleman from Bordeaux. When the corpse of young Calas was discovered, the greatest excitement ensued, and the multitude of Toulouse declared that his family had murdered him in order to prevent his secession from Protestantism. The honors of martyrdom were paid to young Calas, who was buried with great pomp, a catafalque erected upon his grave, and a skeleton placed upon it with a martyr's palm in one hand and the act of abjuration in the other. The father was sentenced to die on the wheel by a tribunal of 18 judges, 5 of whom dissented from the verdict. The sentence was carried into execution, and the body burned to ashes. His youngest son was placed in a convent, with a view of forcing him to abjure Calvinism, and the daughters were shut up in a nunnery. A Catholic servant in Calas's family and Lavaysse were acquitted, although there was much ill feeling against the latter, as he was suspected of being an emissary of the Huguenots of Guéenne. The wife succeeded in escaping to Switzerland, where Voltaire, who then resided at Ferney, became interested in the case; and it was due to his strenuous interference that Élie de Beaumont and other eminent lawyers took it in hand, and obtained a reversal of the judgment. The Calas family were declared innocent, and a pension of 80,000 francs was granted to them by Louis XV.

CALASCIBETTA, a town of Sicily, in the province and 15 m. N. E. of Caltanissetta; pop. about 5,500. Near it are many caverns.

CALASIO, Mario de, an Italian Hebraist, born at Calasio, in the kingdom of Naples, in 1550, died in 1620. While in a Franciscan convent he studied Hebrew and Biblical literature, and was made doctor of theology and professor of Hebrew at Rome. He prepared a Hebrew grammar and dictionary. His great work, *Concordantia Sacrorum Bibliorum Hebraica*, to which he had devoted 40 years, was published shortly after his death under the patronage of Pope Paul V. and Gregory XV. (4 vols. fol., Rome, 1621). In it the passages are cited in Hebrew and Latin, with facilities for comparison with the Arabic, Chaldee, and Syriac versions. An edition was published by Romaine (4 vols. fol., London, 1747-'9), but it is not as accurate as the former one.

CALATAFIMI, a town of Sicily, in the province of Trapani, 84 m. S. W. of Palermo; pop. nearly 10,000. It is called after a Saracenic castle, the ruins of which occupy an eminence, and are used as a prison. The town is ill built, but commands a fine view of the ruins of Segesta and of the adjoining hills, which are clothed with vineyards, olive orchards, and grain fields. It contains several convents and churches. Agriculture is the main occupation, and excellent cheese is made. Calatafimi has given its name to the first successful battle of Garibaldi, May 15, 1860, with a little more than 2,000 men, against the Neapolitans, who had 8,600 men and four guns. The real con-

test was near Vita, four miles from the town; but the Neapolitans after their defeat fled to Calatafimi.

CALATAGIRONE. See CALTAGIRONE.

CALATAYUD, a town of Aragon, Spain, in the province and 45 m. S. W. of Saragossa, on the Jalón, near its junction with the Jiloca; pop. in 1867, 9,823. It was built by the Moors from the ruins of Bilbilis, the birthplace of Martial, which was about two miles E. of the present town. It has a castle, a theatre, and other public buildings. There are two collegiate churches, Santo Sepulcro, built in 1141, and originally belonging to the templars, and Santa Maria, formerly a mosque, having a fine entrance and lofty bell tower. The Dominican convent is an imposing structure. The environs are picturesque and fertile, producing good wine and the best hemp of Spain. In the neighborhood are mineral springs, and caverns with curious stalactites.

CALATRAVA LA VIEJA (Old Calatrava), an ancient city of La Mancha, Spain, now in ruins, on the Guadiana, 12 m. N. E. of Ciudad Real. The city was in the middle ages one of the keys of the Sierra Morena, and was strongly fortified. In 1158, being menaced by the Moors, it was abandoned by the templars, who had held it for 10 years, and the king, Sancho III., promised it to any one who would hold it. Raymond, abbot of Fitero, and Diego Velasquez undertook the task. A crusade was proclaimed, and plenary indulgences were promised to all who should take part in its defence. The Moors abandoned the siege, and Velasquez made inroads into their territories. The order of Calatrava was then founded, consisting of two classes, one for the field, the other for the choir. The knights subsequently separated from the monks, and chose a grand master, while the monks returned to their abbey at Fitero. The knights acquired renown and riches in their contests with the Moors, but in the end quarrelled among themselves, and the pope in 1523 adjudged the grand-mastership to the crown in perpetuity. In 1808 the great possessions of the order were confiscated, and it became simply an order of merit.

CALAVERAS, a N. central county of California, watered by Mokelumne, Calaveras, and Stanislaus rivers; area, 986 sq. m.; pop. in 1870, 8,895, of whom 1,441 were Chinese. The Sierra Nevada is on the E. border. Gold mining is extensively pursued; there is also a copper mine at Copperopolis. The famous big tree grove is in this county. The Stockton and Copperopolis railroad has its terminus in the county. There are 80 quartz mills for the production of gold, with 488 stamps and 5 arrastras. The chief productions in 1870 were 8,341 bushels of wheat, 87,395 of barley, 6,213 tons of hay, 129,025 lbs. of wool, and 99,860 gallons of wine. There were 1,781 horses, 1,995 milch cows, 4,744 other cattle, 35,214 sheep, and 8,178 swine. Capital, San Andreas.

CALAVERAS, a river of California, rises among the hills at the foot of the Sierra Nevada, in Calaveras county, and after a nearly W. course joins the San Joaquin on the border of Sacramento and San Joaquin counties.

CALCAR, Jan Stephan van, a Flemish painter of the Venetian school, born at Calcar in the duchy of Cleves in 1499 or 1500, died in Naples in 1546. He was a pupil of Jan van Eyck, afterward studied at Venice under Titian, and finally practised his art at Naples. At Padua he designed the illustrations to Vesali's anatomical work, which for a long time were ascribed to Titian. Rubens possessed a "Nativity" by him, which he valued highly, and which at his death was purchased by Sandrart, who subsequently sold it to the emperor Ferdinand. One of his most celebrated pictures was the *Mater Dolorosa*. The portrait of a man with red beard, executed by him in 1540, is in the Louvre.

CALCAREOUS SPAR, or *Calc Spar*, crystallized carbonate of lime, a very common mineral. It is remarkable for the great variety of its crystalline forms derived from its primary obtuse rhomboid, no less than 600 modifications having been described and figured. It is seen in a pure state in the transparent rhomboidal crystals of Iceland spar, so called because the finest were originally brought from Iceland. These exhibit the property of double refraction most perfectly. Calcareous spar is white or transparent, except when mixed with some foreign ingredients, which impart to it various shades. It is so soft as to be easily cut with a knife, its hardness being rated at 2.5 to 3.5. Its specific gravity is 2.5 to 2.77. Acids dissolve it readily, causing a strong effervescence as the carbonic acid is expelled. This is also expelled by heat, the mineral being then converted into quicklime, or the protoxide of calcium. The proportion of this in calcareous spar is 56 per cent., and of carbonic acid 44 per cent. Some of the finest specimens of this mineral are from the Rossie lead mine of St. Lawrence co., N. Y., where a single crystal was found weighing 165 lbs. It is a common gangue in metallic veins, and often forms veins in rock formations of almost all ages, even when no ores are present. It possesses no value different from that of ordinary limestones; and these are from their great abundance much more cheaply obtained for the manufacture of quicklime, or for fluxes of ores, than the crystallized mineral could be.

CALCAREOUS SPRINGS. Rain water, containing carbonic acid gas, and other waters also more highly charged with this gas, have the property of dissolving the carbonate of lime with which they come in contact, as they percolate through the strata of rock beneath the surface. When the water rises in springs, it comes charged with calcareous matter; and as it evaporates, this load is deposited in the form of calcareous incrustations. Such springs sometimes rise through granitic rocks and other

formations, which contain little or no limestone, this being in these instances supplied to the water from some distant formations through which it has flowed. Thus the carbonate of lime required by shell fish and plants is distributed abundantly in places that would otherwise be destitute of it. Sir Charles Lyell states that in central France, a district where the primary rocks are unusually destitute of limestone, springs copiously charged with carbonate of lime rise up through the granite and gneiss. Some of these are thermal, and probably derive their origin from the deep source of volcanic heat once so active in that region. One of these springs near Clermont has formed by its incrustations an elevated mound of travertine, or white concretionary limestone, 240 ft. in length, and at its termination 16 ft. high and 12 ft. wide. Another in the same region rises in a gneiss country at the foot of a volcanic cone, at least 20 m. from any calcareous rock. The deposit of these springs is often a spongy, porous substance called calcareous tufa, or calc tuff. It takes the impression of the objects it encloses, as leaves, twigs, and branches of trees, and retains the forms, if not the material itself, in its solid substance. When freshly quarried, it is easily cut into any shape, and is therefore conveniently applied to building purposes. The temples of Paestum are built of it, and the stone has in them assumed great strength and solidity. In the central parts of New York, especially in the vicinity of Seneca and Cayuga lakes, deposits of this nature are very frequent. They form beds of marl beneath muck swamps, and in the bottoms of ponds and lakes. Wherever the calcareous water flows, the aquatic plant *chara* grows abundantly, so as sometimes to obstruct the watercourses, and render its removal necessary. As the plant grows, its stems become incrustated with carbonate of lime, and new green growth continues to shoot out beyond, which is soon to be filled in with the same stony incrustation. The abundance of calcareous matter is as favorable to the growth of fresh-water testacea as of the *chara*; and those which are found in the oldest of these formations are still of the common living fresh-water species.

CALCASIEU, a river of Louisiana, not navigable. It rises in Sabine parish, in the western part of the state, flows through Rapides and Calcasieu parishes, and after a southerly course of about 200 m. enters the gulf of Mexico. An expansion of the river near its mouth, about 18 m. long and 5 m. wide, is called Calcasieu lake.

CALCASIEU, a S. W. parish of Louisiana, bordering on Texas and the gulf of Mexico, having the Sabine river on the W., and the Mermonteau and Bayou Nepique on the E.; area about 5,000 sq. m.; pop. in 1870, 6,733, of whom 1,457 were colored. It is intersected by Calcasieu river and watered by several of its branches. The soil in the vicinity of the streams is fertile, and the surface, which is

level, is principally occupied by savannas or grassy plains, affording pasturage to large numbers of cattle. The chief productions in 1857 were 89,950 bushels of Indian corn, 15,512 of sweet potatoes, 28 hhds. of sugar, 1,120 gallons of molasses, and 605 bales of cotton. There were 886 horses, 1,347 milch cows, 3,666 other cattle, 1,900 sheep, and 4,227 swine. Capital, Lake Charles Court House.

CALCHAS, a legendary Greek soothsayer, born at Megara, induced by Agamemnon to accompany the expedition to Troy. He ordered the sacrifice of Iphigenia, foretold the length of the Trojan war, explained the cause of the pestilence that ravaged the Grecian army, and advised the stratagem of the wooden horse. On his return to Greece he died, in accordance with the prediction of an oracle, on meeting Mopsus, whose power of divination exceeded his own.

CALCIUM (Lat. *calx*, lime), the metallic basis of lime. It is one of the most abundant and important constituents of the crust of the globe, occurring as limestone, gypsum, fluor spar, and phosphates, and in the animal kingdom making up the solid part of the bone. The metal is not found in nature in its pure state, but always in combination. Sir Humphry Davy first prepared the metal in 1808, but not in sufficient quantity to thoroughly investigate its properties. Several methods have been proposed for the isolation of calcium, among which the following are most worthy of mention. Matthiessen employed the electrolytic decomposition of a mixture consisting of two equivalents of chloride of calcium and one equivalent of chloride of strontium. Liesegang obtained it still more easily by fusing iodide of calcium with an equivalent quantity of sodium; and Caron performed the reduction of the chloride by means of zinc. Calcium is a light, yellowish metal, of the color of gold altered with silver. In hardness it is intermediate between lead and gold; it is very malleable, and can readily be hammered into leaves thinner than writing paper. It decomposes water rapidly, with liberation of hydrogen, melts at red heat, and burns to lime with a brilliant light and yellow flame, and is a poor conductor of electricity. Calcium fused with a large excess of zinc forms an alloy, CaZn_{11} , which crystallizes in quadratic octahedrons of sp. gr. 6.87, and is readily decomposed by water. The equivalent of calcium is 20, its symbol Ca. The calcium light, commonly called Drummond light, is produced by the action of the oxyhydrogen flame on perfectly pure lime, made free from silica by precipitation and afterward calcined and pressed into moulds.—The most important salts of calcium will be treated of under their familiar names.

CALCULATING MACHINES. Plato, in the 4th century B. C., invented a sliding square to solve the problem of two mean proportionals, and Nicomedes, three centuries afterward, invented his celebrated conchoid curve for solv-

ing the same problem and trisecting an angle. Some mechanical devices for assisting in arithmetical computation were also in use at a very early age; but these were exceedingly limited in their operations, and therefore of little practical advantage. The same may be said of the more ingenious contrivances devised in the beginning of the 17th century, Gunter's scale and Napier's bones. John Napier, who was probably the first man to suggest the modern notation of decimal fractions, and whose invention of logarithms was well called *canon mirificus*, devised two modes of mechanical computation, one by means of square rods engraved with the Arabic figures, the other by means of circular plates. Napier's discovery of logarithms was made by Edmund Gunter the basis of a very simple machine, consisting merely of a straight line graduated to logarithms, but marked with the corresponding numbers. Addition and subtraction can be performed upon this line by means of a pair of dividers, and the corresponding number by the side of the line will be products, quotients, and factors. But Pascal, in 1642, at the age of 19, invented the first arithmetical machine properly so called. This machine was improved by L'Épine and Boitissendeau about 80 years afterward, but it never came into practical use. It consisted essentially of short barrels, upon whose circumference the 10 figures were inscribed, covered by a box, one figure alone of each barrel being visible through a row of little windows on the upper surface of the box. These barrels were so connected that 10 revolutions in one produced one revolution in the next, the revolutions of the first barrel being performed by hand to correspond with the numbers to be added. Subtraction was performed by the device of having each figure on the wheels accompanied by a smaller figure, such that the sum of the two was equal to 9. Whatever number was added to the large figures was of course subtracted from the smaller. In 1673 Leibnitz published a description of a machine which was much superior to that of Pascal, but complicated in construction and too expensive for the work it was capable of performing, which was only that of arithmetical addition, subtraction, multiplication, and division. But the glory of Pascal and Leibnitz, as inventors of calculating machinery, has been eclipsed by Charles Babbage and by G. and E. Scheutz. The British government began in 1822 to build a machine under Mr. Babbage's direction. Early in 1838 a small portion of the machine was put together, and was found to perform its work with the utmost precision. In 1834 Mr. Babbage commenced the design of a far more powerful engine, but nothing has been done toward its construction. These machines of Babbage are enormously expensive, \$80,000 having been spent in the partial construction of the first. They are designed for the calculation of tables or series of numbers, such as tables of logarithms, of sines,

&c., and are based upon the fact that if we make a new table consisting of the differences between the successive numbers of the first table, then a third consisting of the differences of the successive numbers of the second, then a fourth in like manner from the third, and so on, we shall at length generally obtain a table in which the numbers are all alike. If we had then given to us the first number in each of these tables, we might, beginning with the table in which all the numbers were alike, get back to the original table by a simple process of addition. Thus, by this principle of differences, the computation of all tables is, in general, reduced to a process of addition. The machine prepares a stereotype plate of the table as fast as calculated, so that no errors of the press can occur in publishing the result of its labors. Many incidental benefits arose from the invention, the most curious and valuable of which was the contrivance of a scheme of mechanical notation by which the connection of all parts of a machine; and the precise action of each part, at each instant of time, may be rendered visible on a diagram, thus enabling the contriver of machinery to devise modes of economizing space and time by a proper arrangement of the parts of his invention. This mechanical notation of Babbage ("Philosophical Transactions," 1826) is for an inventor of machinery what the notation of algebra is to the student of geometry.—The machine in the Dudley observatory, Albany, N. Y., was invented by G. and E. Scheutz of Stockholm, and finished in 1853. The Swedish government paid \$20,000 as a gratuity toward its construction. The inventors sought to attain the same ends that Mr. Babbage had attained, but with simpler means. Their engine proceeds by the method of differences, calculating to the 15th place of decimals, and stamping the eight left-hand places in lead, so as to make a stereotype mould from which plates can be taken by either a stereotype or electrotype process, ready for the printing press. It can express numbers either decimally or sexagesimally, and prints by the side of the table the corresponding series of numbers or arguments for which the table is calculated. It has been employed at Albany in calculating a table of the true anomaly of Mars for each tenth of a day.

CALCULI, stone-like concretions which form in different parts of the body, often about some undissolved particle in the fluid, which holds the matter of the concretion in solution, and again as a deposit upon some hard surface, as the tartar which collects upon the teeth. In the intestines the concretionary deposits are sometimes mechanical agglutinations of dry fibrous particles, as the fine down of the oat gathered about a piece of bone or stone of some fruit, and intermixed with layers of phosphate of lime. The fluids of the body may deposit concretions in most of the vessels, organs, and tissues. They are left by the blood in the arte-

ries and valves about the heart; by the saliva in the mouth, in the substance of the cheek as well as upon the teeth; and by the bile in the gall bladder. They are found in the tissue of the lungs and in the bronchial glands, and in gouty persons under the skin, about the joints of the fingers and toes, &c. But their most common occurrence is in the kidney, bladder, and urinary passages, left by decomposition of the complex fluid of these organs. Urinary calculi are variously composed, and may be classed as those which are soluble in caustic potash or soda, and those which are insoluble. One of the most common of the former class is the uric acid calculus. This ingredient in urine, when secreted in undue proportion, forms minute red crystals and red sand, which are passed in a solid state. If retained, they increase in size and produce the disease called the stone. The acid, if greatly in excess, is deposited in successive layers, forming yellowish-colored stones of such size that they can be removed only by the operation either of lithotomy, which is making an incision into the bladder and removing the stone by forceps, or of lithotripsy, which is the introduction of an instrument into the urethra, by which the stone is broken, so that it may be removed by voiding it in fragments. If the uric acid is not in excess, the concretion once produced is liable to be covered with an incrustation of an ammonio-phosphate of magnesia or of a phosphate of lime, and thus increase in size. These phosphates, when deposited alone, as is sometimes the case, are included among the insoluble calculi, of which other varieties are produced in the form of oxalate of lime, called, from their resemblance to the mulberry, the mulberry calculus, of a brown color and mamelonated form, which are sometimes nuclei for the uric acid calculus; and again as carbonate of lime, which are of rare occurrence. Other calculi, which belong to the soluble class, are formed with uric acid in combination with ammonia; others of cystic oxide or cystine, and of xanthic oxide or xanthine. These are distinguished from each other by their various shades of color, different degrees of hardness, and their peculiar reaction with different chemical agents. Concretions of uric acid are not uncommon with children, and recur in the same persons in advanced age. Those are most liable to them who suffer from dyspeptic and gouty tendencies. When this is observed, serious trouble may in most cases be obviated by particular attention to the diet, and by the use of proper medicines; but if the concretions are allowed to increase till they are too large to be passed, there is then no recourse but an operation; for, once formed, they are never afterward absorbed, nor has any solvent for them been discovered upon which dependence can be placed.—Calculi deposited by the bile in the gall bladder, the liver, and its ducts, are known as biliary concretions and as gall stones. They are generally of a round or oval form,

and of various colors, as white, yellow, brown, and dark green. Usually they are soft, and sometimes brittle and easily pulverized to an unctuous powder; their size has in some cases reached that of a walnut. In man they generally consist of cholesterine, more or less intermixed with the mucus and coloring matter of the bile; but some have been found consisting of carbonate of lime 72·7 per cent., phosphate of lime 18·51, and mucus 10·81. In animals their composition is very variable, some consisting of the same ingredients as are found in those of men. In the stomachs of ruminating animals they are found in the form of balls of hair, earthy matter, and food, cemented around some hard central nucleus.

CALCULUS, in mathematics, a mode of calculating. In this broad signification we may speak of common arithmetic and algebra as forms of a calculus. Thus also trigonometry is called the calculus of sines, and the doctrine of chances is spoken of as the calculus of probabilities. The branches of mathematics to which the term is more especially applied are the differential calculus, integral calculus, calculus of variations, to which we may add the calculus of imaginaries, that of residuals, and that of quaternions.—The **IMAGINARY CALCULUS** investigates the nature of quantities which are required to fulfil apparently impossible conditions. It has been discovered by means of this calculus that every absurdity in geometry can be reduced to an attempt to measure a straight line in a direction different from that of its length; and that every algebraic absurdity can be represented by one symbol, always capable of this one geometrical interpretation. This extensively useful calculus has been chiefly developed by M. Cauchy.—The **RESIDUAL CALCULUS** investigates cases of apparent impossibility, arising from the attempt to measure a quantity which has become immeasurably great. Imaginaries and residuals are chiefly employed as subsidiary to the operations of the higher species of calculus.—The **DIFFERENTIAL CALCULUS**, called by the English fluxions, is the most valuable of mathematical modes, from the great variety of subjects to which it is applicable, and from the strength of its solvent power. Its discovery is justly assigned to the latter part of the 17th century, although there were doubtless some hints of it among earlier writers. Archimedes had demonstrated the area of a parabola to be two thirds of its circumscribing rectangle, and also the truth of his celebrated propositions concerning the sphere and the cylinder. Kepler, seizing the spirit of his method, introduced the words infinite and infinitesimal into geometry. Cavalieri, Roberval, and Fermat enlarged the application of his mode. In the mean while Vieta, Cardan, Harriot, and others had improved algebra, and Descartes had applied it to geometry by his invaluable system of variable coördinates. Thus the way was prepared for Leibnitz and Newton, who, indepen-

dently of each other, invented the differential calculus, although differing in the form in which they conceived of and expressed the same truths. Newton's discovery or invention was made in 1665, and that of Leibnitz several years later. The notation of the latter was so convenient, and his mode of attacking the subject has such a practical superiority for the learner, that Newton's method of fluxions has now gone completely out of use; although in a metaphysical point of view Newton's mode is not open to the objections which may be brought against that of Leibnitz. The discovery of this method originated in the investigation of curved lines, but is extended to the consideration of every species of magnitude. Newton conceived of a curved line as generated by the motion of a point; and the spirit of his method consists in determining the velocity with which the point, at each instant, is moving in a given direction different from that of the line; that is, *e. g.*, if the point be moving in a general southwesterly direction, in determining the velocity with which it souths compared with that with which it wests. The spirit of Leibnitz's method consists in supposing the curve to be composed of infinitely short straight lines, and in determining the direction of each of these lines. Lagrange in his *Théorie des fonctions* endeavored to treat the calculus from a purely algebraic point of view, and invented a new notation, but in his other works he always made use of the notation of Leibnitz.—The INTEGRAL CALCULUS is the reverse of the differential, and seeks to find from a known ratio between the changes of two quantities mutually dependent on each other what the relation or law of dependence between the quantities themselves must be; or, in the language of the calculus, the integral of a given function (*i. e.*, law of dependence) is a required new function of which the given function is the differential.—The CALCULUS OF VARIATIONS investigates the changes produced by gradually altering the laws of dependence which bind the variable quantities together. This invention of Lagrange crowns the calculus of functions, which by means of these five branches is capable, under a master's hand, of tracing out very complicated and intricate chains of inter-dependence in every part of the domain of quantity. And yet there is not one of these calculi that can answer all the questions which the physical sciences ask of it. More powerful engines of analysis may yet be invented by future mathematicians.—The CALCULUS OF QUATERNIONS, published by Sir W. R. Hamilton in 1853, promises to do something toward supplying this defect. By combining in one notation the direction as well as the length of a line, he is able to express in a single symbolical sentence an amount of geometrical truth which in ordinary analytical geometry would require at least four sentences. No other writer has yet mastered this powerful instrument sufficiently to use it with ease; but the verdict of mathema-

ticians is unanimous in praise of its ingenuity and probable future utility.—The difference between the powers of the principal calculi may be familiarly illustrated by the cycloid, a curve described by a nail head in the tire of a wheel rolling on a straight level road. The differential calculus would investigate the direction in which the nail head moves at each instant of its motion, and show the proportion between its rise, its fall, its horizontal motion, its motion through space, the curvature of its real path, and the revolution of the wheel at each instant. The integral calculus would, from these elements, discover how far the nail head travelled in one revolution of the wheel, how much space is enclosed between its path and the ground, &c. The calculus of variations would consider the change made by the wheel rolling over a hill, or would show how the cycloid differs in its properties from similar curves.—The calculus is too difficult and abstruse for any popular exposition. The reader may find general views upon the subject in Davies's "Logic of Mathematics," and Comte's "Philosophy of Mathematics," translated by Prof. Gillespie, or in French in Carnot's *Réflexions*. For gaining a practical acquaintance with the science there are numerous accessible treatises, among which Church's and Courtenay's are well adapted to ordinary students, but Peirce's conducts much more rapidly into the highest walks. Of English treatises, Price's holds a high rank; but the most extensive treatise in the English language is that by Augustus De Morgan, published by the society for the diffusion of useful knowledge. The treatise of I. Todhunter is highly esteemed as a practical work. Among the best German works is that of Dr. Martin Ohm. The French have been prolific writers upon the subject; among them Duhamel holds a high rank, and the treatise of Lacroix (8 vols. 4to, 1810-'19) is the most elaborate that has yet appeared in any language.

CALCUTTA (*Kali Ghatta*, the ghaut or landing place of the goddess Kali, wife of Siva), a city of Hindostan, capital of the province of Bengal, metropolis of British India, and seat of the supreme government of that country, situated 100 m. from the sea, on the E. bank of the Hoogly river, the W. branch of the Ganges, its citadel being in lat. $22^{\circ} 34' 49''$ N., lon. $88^{\circ} 27' 16''$ E. In 1866 the population of the city proper was 377,924, of whom 239,190 were Hindoos, 113,059 Mohammedans, 11,224 Europeans, 11,086 Eurasians (progeny of a European father and a native mother), and 681 Jews; the population of the suburbs was 238,325; total of city and suburbs, 616,249. The population of the city in 1872 was 447,601.—On ascending the Hoogly, the scenery, which for many miles from the sea is dreary and uninviting, becomes more picturesque as one approaches Calcutta. No land is visible at the mouth of the river, the channel of which is marked out by lighthouses and buoys, and must be followed many miles inland before the

low lands of the Sunderbunds can be detected. Nearing the city, which extends about 6 m. along the river and has an average breadth of about 2 m., the botanical gardens are perceived on the W. bank, stocked with many varieties of indigenous and exotic plants, and the Bishop's college, a handsome Gothic edifice erected under the auspices of the society for the propagation of the gospel in foreign parts. The beautiful suburb known as Garden Reach, opposite the river anchorage, occupies the E. shore, with country seats surrounded by elegant gardens. Here stands the vast palace of the dethroned king of Oude, where he resides as a pensioned prisoner of state, receiving from the British authorities an annual income of £120,000. Its architecture is gorgeous and much admired. North of this is the Maidan or plain, a level open space not quite 2 m. long, $1\frac{1}{2}$ m. wide at its southern, and about $\frac{3}{4}$ m. at its northern extremity. In the Maidan, nearly equidistant between these boundaries, and not far from the river, is Fort William, the citadel of Calcutta. The works are low and octagonal in outline, three sides facing the Hoogly. The fortress mounts 619 guns. A garrison of 10,000 troops would be requisite to defend it, and even 15,000 can be accommodated within the walls. Its heaviest batteries are on the river front. That portion of the Maidan lying between the fort and the main body of the city is known as the Esplanade. Beyond the Maidan to the northward rises the "city of palaces," as Calcutta has frequently been called; and viewed from the river the appearance of the city is so magnificent as to justify the appellation. A closer examination, however, casts a doubt upon its correctness. Opposite the town, the river varies in width from a quarter to three fourths of a mile, and affords anchorage for ships of 1,500 tons burden, in six or seven fathoms of water. Owing to the hurricanes which sometimes prevail, the roadstead is not a very safe one; and it is usual to moor vessels to the shore, as a precautionary measure. The water front is bordered by a quay 2 m. long, called the Strand, at a level of 40 ft. above low-water mark, with ghauts or landing places at intervals along it.—Calcutta is situated on level land, and is divided into a northern or native and a southern or European district. In the quarter inhabited by the native population the streets are narrow and unpaved, with lofty houses loopholed in the upper stories, and occupied as shops or stores on the ground floor. There is much poverty and filth in many localities. The section of the city chiefly inhabited by Europeans is called Chowringhee. The European houses are built of brick covered with stucco, are generally detached from one another, and have spacious verandas. There are several extensive squares in this quarter, each of which encloses a tank near the middle, with a planted walk surrounding it. A street 60 ft. in width intersects the city parallel to its greatest length.

The Strand extends southward along the river border of the Maidan, here forming the favorite pleasure drive of the European residents and wealthy natives. The northern portion of the Esplanade contains the government buildings, fronting a park called the Eden gardens. Of these, the viceroy's palace, known as the government house, is the finest edifice in Calcutta. It stands in a conspicuous locality, is of massive proportions, and consists of a spacious central structure surrounded with four great wings and surmounted by a magnificent dome. The other government offices, the town hall and the post office, which is built on the site of the memorable black hole, are also in the Esplanade, which is ornamented with an equestrian statue of Lord Hardinge. The monument of David Ochterlony, near the N. E. corner of the Maidan, is a lofty tower commanding a view of the city and all the surrounding country. For the most part the residences of the foreign merchants and officials are E. of the Maidan, the eastern boundary of which is the Chowringhee road. Many of these dwellings are palatial, some of the most elegant being in a range on a line with the government house called Esplanade row. In addition to those already mentioned, the principal buildings comprise the new Anglican cathedral, the mint, the numerous Christian churches, Protestant, Roman Catholic, and one Greek and one Armenian, the Jewish synagogue, the Mohammedan mosques, and the Hindoo temples. The Sikhs have a place of worship, as also have the Chinese. There are many educational institutions, secular and religious, the university of Calcutta being the most important of the former. It was originally the college of Fort William, and was designed for the instruction of candidates for the civil service of the East India company; its purposes are now more general, although its functions are limited to holding examinations and granting degrees. More than 800 students matriculated in 1867. Its lowest degree is believed to indicate acquirements equal to those of the graduate of a European university. The Madrassa or Mohammedan college, the Hindoo college, the Sanskrit college, and the Anglo-Indian college are establishments also under government control. The Martinière is an institution for the education of the poor of both sexes, founded under the will of Gen. Claude Martin, who amassed great wealth in the East. The Bishop's college, established in 1819 by Bishop Middleton, trains students in the doctrines of the church of England, for missionary work in India. Colleges are also supported by the established church, the Free church of Scotland, and the Jesuits. There are numerous hospitals, a public library, a theatre, and many literary and scientific institutions: among the latter the Asiatic society, formed in 1784, through the efforts of Sir William Jones, stands preëminent. The medical college is distinguished for the ability and learning of its fac-

ulty.—Calcutta is supplied with water by means of tanks constructed to collect the periodical rains. All endeavors to procure water by boring have hitherto failed; the soil seems peculiarly deficient in springs, even though it has been pierced to a depth of 500 ft. The tanks, of which the city contains more than 1,000, are of masonry, and preserve the water in excellent condition. It is distributed by carriers, who convey it about in leathern bags.

The climate, formerly considered exceedingly dangerous to foreigners, has been somewhat ameliorated by the adoption of proper sanitary measures; but of its extreme unhealthiness during the hot season there can be no question. When summer sets in, every official who can do so leaves Calcutta. The average annual rainfall is about 64 inches. The rainy season lasts from June to October. The temperature ranges from a monthly average of 66° F. in December and January to one of 85° in April and May, 83° in June, and a maximum of 100° to 110° in the open air in the last named month. Vultures, kites, crows, and the adjutant stork by day, and foxes, jackals, and wild dogs by night, act as public scavengers, and perform a most important office, which doubtless essentially contributes to the health of the city.—The British merchants form the most influential and wealthiest class, and are noted for their hospitality. The Armenians are largely engaged in commerce with various parts of the East, and the retail trade is almost monopolized by the natives. The shops or bazaars are furnished with a plainness which must strike a stranger forcibly, but every kind of goods of every quality can be purchased as readily as in England. An industrious and serviceable class are the Eurasians, who are employed to a considerable extent in mercantile houses and as government clerks. The brokers, denominated sircars and baboos, are exclusively Hindoos. The foreign trade of Calcutta is mainly in the hands of English merchants. The commerce of nearly all the interior of Bengal, and of a very large proportion of India, centres here. The chief exports are opium, cotton, rice, indigo, jute, seeds, silk, hides, saltpetre, sugar, and lac; the principal imports comprise cotton twist and yarn and piece goods, metals, railway materials, machinery, wines and spirits, salt, woollen goods, malt liquor, wearing apparel, and books and stationery. In the year ending March 31,

1872, the imports into Bengal represented a value of £19,741,420, and the exports £27,849,329. By far the largest portion of this trade goes through Calcutta. In the year 1869-'70 923 vessels entered the port, and there were 936 clearances.—Calcutta is connected by railway and telegraph with Bombay, and with the large cities of northern and central India, and by regular steamship lines with Europe and all the great countries of the East. The



Government Buildings and Ochterlony Monument.

Anglican see of Calcutta was established in 1814, and the bishop is the primate of India. A high court of general appellate jurisdiction holds its terms at Calcutta. The city is a favorite field for missionary enterprises, and missionaries of all denominations are to be found there. A number of newspapers and magazines are regularly published in English, and several in the different native languages.—The site of Calcutta was originally occupied by the village of Govindpore. In 1698 the English factories at Hoogly were removed thither by the East India company. In 1700 three small villages near the factories, one of which bore the name of Calcutta, were assigned to the British by the native rulers. One of these villages occupied the site of the present European quarter, another stood where the native residences are now erected, and the third has given place to the beautiful plain on the S. side of the city, in the midst of which stands the citadel. In 1756 the settlement, which then contained only 70 houses occupied by Europeans, was captured by Surajah Dowlah, the subahdar of Bengal. (See BLACK HOLE.) The British forces under Clive regained supremacy and recovered the town early in the following year. The construction of Fort William, the most extensive and elaborate regular fortress in India, was begun in 1757, after the battle of Plassey; and in 1758 Meer Jaffer, the successor of Surajah Dowlah as native viceroy, remit-

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ted the rent which the East India company had previously paid for the tenure of the city. The subsequent career of Calcutta has been peaceful and prosperous.

CALDANI, Leopoldo Marco Antonio, an Italian anatomist, born in Bologna, Nov. 21, 1725, died in Padua, Dec. 30, 1818. He studied in his native place, devoting himself especially to anatomy, and became professor in the university in 1755. He distinguished himself by a series of experiments to prove the insensibility of the tendons, publishing the results in 1757 under the title of *Lettera sulla insensibilità ed irritabilità di alcune parti degli animali*. This work gave him professional fame throughout Europe; but in Bologna itself he met with great opposition, and about 1780 he went to Venice, whence he was called to Padua as professor of theoretical medicine, and in 1771 he succeeded Morgagni as professor of anatomy, holding the office till his death. His principal works, besides that named above, are *Icones Anatomicae* (4 vols., Venice, 1801-'14), in the publication of which he was assisted by his nephew Florian, also an anatomist of great reputation, and *Explicatio Iconum Anatomicarum* (1802-'14). He also published many less important works.

CALDARA, Antonio, an Italian composer, born in Venice in 1678, died there, Aug. 28, 1768. At the age of 18 he wrote a successful opera, and for many years devoted himself exclusively to that species of composition. He was for a while instructor in music to the emperor Charles VI. at Vienna. He abandoned the stage on the failure of his opera of "Themistocles" in 1736, and during the remainder of his life wrote sacred music.

CALDARA, Poldero. See CARAVAGGIO.

CALDAS, Francisco José de, a naturalist of New Granada, born at Popayan about 1770, executed by order of Morillo, Oct. 30, 1816, for espousing the cause of independence. He mastered the rudiments of astronomy, botany, and medicine, and constructed a barometer and sextant, although he had not even books to guide him in his studies. He accompanied for some time the Spanish explorer, J. C. Mutis. Subsequently he explored the Andes and the Magdalena river, and in 1804 measured the height of Chimborazo and Tunguragua. He was afterward director of the observatory at Bogotá, and in 1807 commenced the *Seminario de la Nueva Granada*, a scientific journal, republished at Paris in 1849, in 1 vol. large 8vo.

CALDAS PEREIRA DE SOUZA, Antonio, a Brazilian poet, born in Rio de Janeiro, Nov. 23, 1762, died there, March 2, 1814. He studied at the university of Coimbra in Portugal, and spent most of his life in Europe, returning to Brazil in 1808. While at the university he gave umbrage to the inquisition, and on being consigned to a convent devoted himself to the clerical profession. His writings, which are marked by a high moral tone, especially an ode on "Man in the State of Barbarism," were

published in Paris in 1821, under the title of *Poesias sagradas e profanas*, with a commentary by Gen. Stockler. A new edition was brought out at Coimbra in 1836.

CALDER, a river of England, in the West Riding of Yorkshire. It rises near Burnley, on the E. borders of Lancashire, and flows E. until it reaches Wakefield, where it makes a bend to the north, and joins the Aire near Castleford, after a course of 40 m., for 30 of which it is navigable. It is important as a part of the transportation route across the kingdom from Liverpool to Hull, and is connected by canals with Todmorden, Rochdale, Huddersfield, Goole, Halifax, and Barnsley.—A small stream in Lancashire, and two in Scotland, bear the same name.

CALDERA, a seaport town of Chili, in the province of Atacama, 52 m. W. N. W. of Copiapó, in lat. 27° S., lon. 70° 57' W.; pop. between 3,000 and 4,000. The town was built about 1840 to serve as an outlet for the mineral products of the region round about Copiapó, and is very prosperous. The streets are regular and wide, and many of the dwellings and public edifices handsome; but the inhabitants suffer much from the want of suitable drinking water, which hitherto could be procured only by distilling sea water. In 1872 the authorities began to take measures for the introduction of good water by pipes from the highlands beyond the desert which forms a large part of the province. A railway about 95 m. long connects Caldera with Copiapó and San Antonio. The bay, though in general shallow, is well sheltered, has a lighthouse at the S. W. entrance, and a commodious mole of recent construction. Trains run to the end of the mole. In 1867 the clearances were 850; tonnage, 264,110.

CALDERON DE LA BARCA, Frances Ingh, madame, an author, born in Scotland in the early part of this century. Her youth was passed in Normandy. With her mother she came to the United States, and they established a school in Boston. In 1838 she married Don Calderon de la Barca, the Spanish minister at Washington. Her husband having been appointed minister to Mexico, she accompanied him thither, and in 1843 published "Life in Mexico," with an introduction by W. H. Prescott. She resides in Spain, and receives a pension from the government.

CALDERON DE LA BARCA, Pedro, a Spanish dramatist, and next to Shakespeare the greatest of modern playwrights, born in Madrid, Jan. 17, 1600, died there, May 23, 1681. The name of his mother, Hensao y Riaño, whose family had originally emigrated from the Low Countries to Spain, is occasionally found added to his own. His father, who was connected with the financial branch of the government under Philip II., bequeathed to him ancestral estates in the valley of Carriedo (Burgos), and died before his son had reached his 9th year. He received his education in a college of Jesuits, and at Salamanca, where he studied history.

philosophy, and law, and produced several plays which gained for him influential admirers and patrons. He left the university in 1619 to seek employment at the court, where Lope de Vega was among the first to praise his contributions to the contests for poetical composition (1620-'22). In 1625 he became a soldier, and served respectably in Italy and Flanders, but was recalled to Madrid in 1635, on the death of Lope de Vega, and appointed by Philip IV. superintendent of the royal theatres and festivals. In 1636 he was made a knight of Santiago and took part in a campaign in Catalonia, remaining in the military service until the peace of 1641. The king now gave him a pension of 30 gold crowns monthly, and employed him exclusively in writing and producing plays and managing the festivals of the court, the expense of bringing out his pieces in the most costly style being borne by the royal treasury. In 1651 he obtained from the order of Santiago permission to become a priest, and two years later was appointed chaplain to the cathedral of Toledo. In 1668 he was attached to the royal chapel in Madrid, and received as a member of the brotherhood of St. Peter, by whom he was finally chosen to be their *capellan mayor*, and to whom on his death he bequeathed his large fortune. To the last he was incessantly engaged in writing, and his death was deplored as a public calamity, his popularity having gradually extended from the court, the clergy, and the higher classes to the masses of the people. His funeral, which at first took place, according to his request, with the utmost simplicity in the church of San Salvador, had to be celebrated over again in a more conspicuous manner, while public demonstrations of sympathy were made in Rome, Naples, Milan, and Lisbon. His remains were removed, April 19, 1841, to the campo santo adjoining the Atocha church, where a fine monument was erected in his honor by public subscriptions.—Calderon had no superior in the fertility of his inventive power or in the skilful arrangement of ingenious, entertaining, and striking plots, and startling stage effects, which latter faculty was, according to Goethe, the most remarkable characteristic of his genius. His works continue to be held in the highest esteem in Spain, and have been the source of inspiration for English, French, German, and Italian dramatists. He was barely 15 when he wrote his first play, *El carro del cielo*, and over 80 when he wrote his last, *Hado y divisa*, founded on the story of Boiardo and Ariosto. His principal productions may be divided into three classes: I. Over 70 sacramental *autos* or religious outdoor plays for Corpus Christi day or other church festivals, and chiefly on allegorical subjects mixed with national and Scriptural incidents and stories, and also occasionally with amorous passages, especially the most celebrated of them, *El divino Orfeo*, which is partly set to music, like many of his other plays.

The *autos* opened with a prologue (*loa*), which was recited or chanted; next came a farcical *entremes*, and last the *auto* or sacramental act proper. They all abound in lyrical beauty, and were produced in a gorgeous manner, characteristic of the lingering Moorish elements in Spanish civilization. Some of them partake of such extravagance as Aristophanes displayed in the representation of Greek divinities, and others of the brilliancy of Ben Jonson's poetical masques. The all-pervading purpose was to exalt the doctrine of the real presence in the eucharist, and many shadowy characters are introduced to personate evils and blessings, Satan playing a conspicuous part in many fantastic forms. II. There are about 15 religious and miracle plays, though chiefly called so to evade the restraints imposed in Spain on theatrical performances from 1644 to about 1649. Many of them were acted by priests in the palaces of the nobility, the sanctimonious title serving only as a cover for loose plots and free writing. Most admired among them was the *Purgatorio de San Patricio*, founded on the story of the Irish St. Patrick, with a regular love plot and the inevitable clown (*gracioso*); and the *Devocion de la cruz* (translated into German by A. W. von Schlegel), which, though still more licentious, became a favorite even in Protestant countries on account of its exquisite devotional passages. The most famous of the miracle plays was *El magico prodigioso*, founded on the legend of St. Cyprian, and so Faust-like in its metaphysical and mystical poetry that the German Rosenkranz has written an explanatory work on it, entitled *Ueber Calderon's Tragödie vom wunderthätigen Magus* (Halle, 1829). Milman has paraphrased it in his "Martyr of Antioch." III. Over 100 secular plays, different from the preceding ones in not assuming to be religious, and consisting of tragedies, dramas, comedies, and melodramas, and a few operas like *La púrpura de la rosa* and *Las fortunas de Andromeda y Perseo*, both adapted from Ovid's *Metamorphoses*. The best known of these plays in foreign countries is perhaps *El príncipe constante*, founded on the disastrous expedition of the Portuguese infante Ferdinand against the Moors. The most powerful of those pieces in which the passions form the groundwork of the plot are *Amar después de la muerte*; *El médico de su honra*; *El pintor de su deshonra*; and above all, *El mayor monstruo los celos* ("No Monster like Jealousy"), founded on the story of Herod in Josephus. This last named tragedy has been often compared to Shakespeare's *Othello*. The so-called *comedias de capa y espada* (cloak and dagger comedies), depending for success mainly on their intrinsic wit, illustrate Calderon's talent for brilliant dialogue and amusing complications. Some of the most popular among these are *La dama duende* ("The Fairy Lady"), which he himself regarded as his masterpiece, and *El astrólogo fingido*, adapted to the French

by Thomas Corneille, and from the latter into English in Dryden's "Mock Astrologer." Many of his spectacular plays were performed with great splendor in the royal palaces and the adjoining pleasure grounds, different sets of actors being occasionally engaged in the succeeding acts of the same piece.—The publishers of the day took such liberties with Calderon's name, that he reluctantly consented to attend to the printing of his sacramental plays, lest they should be desecrated by garbled and surreptitious texts; but he personally never sent any of his other productions to the press, and over 100 pieces with which he had nothing to do were circulated as his in the Spanish dominions on both sides of the Atlantic. His brother had four volumes of his dramas published (1640-'74) without the authority of Calderon, who, however, did not dispute their genuineness. At the request of one of his most munificent patrons, the duke of Veraguas, Calderon sent him a catalogue of 111 dramas and 70 sacramental autos which he claimed as his own, though these figures show a discrepancy as compared with those of the editions of his friend Vera Tassis (9 vols., 1682-'91) and of Apontes (11 vols., 1760-'68). The former, in his "Life of Calderon," credits him with 100 short farces (*saynetes*), 100 autos with 200 prologues or *loas*, and over 120 comedies; but he only published about 70 autos and 108 comedies. A number of Calderon's works have evidently never been printed, while those generally attributed to him may possibly include a few of which he is not the author, and certainly in some of them he wrote only single acts. De Castro published in Cadiz (1848) a volume of Calderon's smaller poems, but most of his works of that sort have been lost, though the titles of many of the sonnets which he wrote for the academies of which he was a member and on other occasions have been preserved. Some of the occasional sonnets in the plays are masterpieces of wit and elegance. Of the dramatic works Keil has published a collection (4 vols., Leipzig, 1827-'80), and another more complete one is that of Hartzenbusch (4 vols., Madrid, 1848-'50). Among the English translations of his dramas are two volumes by McCarthy (London, 1853), and Archbishop Trench's "Life's a Dream: The great Theatre of the World. From the Spanish of Calderon, with an Essay on his Life and Genius" (1856; new ed., with specimens of Calderon's plays, 1865). The *Chefs d'œuvre des théâtres étrangers* contains French translations of a number of his plays by Esménard and Labaumelle (3 vols., Paris, 1845). Among the principal German translators are A. W. von Schlegel (2 vols., Berlin, 1803-'9), Gries (7 vols., 1815-'26), Malsburg (6 vols., Leipzig, 1819-'25); and of the autos exclusively, Eichendorff (2 vols., Stuttgart, 1846-'53), and Lorinser (2 vols., Ratisbon, 1856-'7). The best critical work upon his dramas is Schmidt's *Schauspiele von Calderon* (Elberfeld, 1857),

and the latest collections are in Rapp's *Spanisches Theater* (6 vols., 1870), and Barrera's critical edition of his works (Madrid, 1872).

CALDERWOOD, David, a Scottish clergyman and historian, born about 1575, died at Jedburgh in 1651. In 1604 he became minister of Crailing, Roxburghshire; and in 1608, for rejecting the jurisdiction of the bishop of Glasgow, he was confined to his parish, and for several years was prevented from taking any share in the public business of the church. In 1617, with several of the clergy, he signed a protest to parliament against an article, or bill, by which the power of framing new laws for the church was to be intrusted to an ecclesiastical council appointed by the king. A commission court in regard to this protest sat at St. Andrews, to which Calderwood was summoned to answer for his seditious and mutinous behavior, and King James, who was present, examined him in person. When threatened with deprivation, he denied the authority of the bishops, and for his contumacy was imprisoned in St. Andrews, and afterward was banished from the kingdom. From 1619 till the death of King James in 1625 he lived in Holland, and published there in 1623 his treatise *Altare Damascenum*, originally published in English under the title "The Altar of Damascus" (8vo, 1621), in which he exposes the means by which the polity of the church of England was intruded upon that of Scotland. After his return to Scotland he lived for several years in Edinburgh, and was engaged in preparing his history of the Scottish church. In 1638 he resumed his duty as a parish minister at Pencilthland, East Lothian; and in 1651, when Cromwell's army occupied the Lothians, he retired to Jedburgh. An abstract of his history was published by the general assembly in 1646, and the work was published complete 27 years after his death as the "True History of the Church of Scotland from the Beginning of the Reformation unto the End of the Reign of James VI." (fol., 1678). An edition in 5 vols. 8vo, from the original MS., edited by the Rev. J. Thomson, was published at Edinburgh in 1842-'9.

CALDIERO, a village of N. Italy, in the province and 8 m. E. of Verona; pop. about 2,000. Here, and on the neighboring height of Colonna, Napoleon was checked (Nov. 12, 1796) by an Austrian army under Marshal Alvinczy, previous to his memorable victories at Arcole (Nov. 15-17). Masséna opened at Caldiero the campaign against Austria in 1805, and fought several hot engagements (Oct. 29-31), after which he was compelled to abandon the field; but the archduke Charles, the Austrian commander, being himself constrained to retreat on receiving tidings of the capitulation of Ulm, Masséna was left at liberty to push on with his army.—Caldiero was anciently called Calidarium from its thermal springs, which are strongly sulphurous. The baths were built or restored in the first year of the Chris-

tian era, and continued to be used till about 1240, when they were destroyed by Ezzelino, the leader of the Veronese Ghibellines. At the close of the 15th century an attempt was made by the republic of Venice to revive them, but at the present time they are seldom visited.

CALDWELL, the name of five counties in the United States. **I.** A N. W. county of North Carolina, bounded S. E. by the Catawba river; area, 450 sq. m.; pop. in 1870, 8,476, of whom 1,380 were colored. A portion of the surface is mountainous, the N. W. part comprising a declivity of the Blue Ridge. The Western North Carolina railroad touches the S. boundary. The chief productions in 1870 were 24,455 bushels of wheat, 207,781 of Indian corn, 85,818 of oats, and 27,000 lbs. of tobacco. There were 868 horses, 223 milch cows, 4,161 other cattle, 5,976 sheep, 18,210 swine. Capital, Lenoir. **II.** A parish of Louisiana, intersected by the Washita, which is here navigable by steamboats, and drained by affluents of Little river; area, 528 sq. m.; pop. in 1870, 4,820, of whom 2,224 were colored. The surface is hilly. The chief productions in 1870 were 75,741 bushels of Indian corn, 15,512 of sweet potatoes, and 4,157 bales of cotton. There were 878 horses, 1,488 milch cows, 4,540 other cattle, 2,843 sheep, and 10,117 swine. Capital, Columbia. **III.** A S. E. county of Texas; area, 535 sq. m.; pop. in 1870, 6,572, of whom 2,581 were colored. It has an undulating, well wooded surface, and a good soil, abundantly watered by the San Marcos river, which forms the western boundary, and by several small creeks. The forests contain live oak, elm, cottonwood, post oak, hickory, and ash. It is chiefly an agricultural county, though stock-raising is pursued to a considerable extent. The Lockhart springs, about 20 in number, are at the county seat. The chief productions in 1870 were 190,965 bushels of Indian corn, 12,089 of sweet potatoes, and 1,692 bales of cotton. There were 3,842 horses, 3,331 milch cows, 16,824 other cattle, 4,234 sheep, and 7,784 swine. Capital, Lockhart. **IV.** A W. county of Kentucky, bounded N. E. by an affluent of the Ohio river; area, about 350 sq. m.; pop. in 1870, 10,826, of whom 2,078 were colored. The surface is generally level; there are pasture lands scattered over the county; iron ore is abundant, and a large bed of coal has been opened in the northern part. The Elizabethtown and Paducah railroad will pass through the county. The chief productions in 1870 were 56,847 bushels of wheat, 438,660 of Indian corn, 26,667 of oats, 18,727 lbs. of wool, and 2,221,899 of tobacco. There were 2,377 horses, 1,275 mules and asses, 2,010 milch cows, 3,103 other cattle, 9,226 sheep, and 14,092 swine. Capital, Princeton. **V.** A N. W. county of Missouri, intersected by Shoal creek, and having a flat surface and a rich soil; area, 485 sq. m.; pop. in 1870, 11,390, of whom 284 were colored. The Hannibal and St. Joseph railroad passes through the N. part. The chief productions in 1870 were

104,130 bushels of wheat, 728,121 of Indian corn, 217,040 of oats, 59,872 of potatoes, 6,745 tons of hay, 206,150 lbs. of butter, and 86,374 of wool. There were 5,212 horses, 3,571 milch cows, 7,891 other cattle, 12,806 sheep, and 15,903 swine. Capital, Kingston.

CALDWELL, a post village, capital of Warren county, N. Y., 52 m. N. of Albany; pop. in 1870, 1,041. It stands in the midst of a picturesque region at the S. end of Lake George, and is much visited by tourists. A steamboat plies between it and the outlet of the lake. It contains the ruins of Fort George, memorable in the French and revolutionary wars; and the Fort William Henry hotel, on the site of the old fort of that name, is one of the largest in the United States.

CALDWELL, Charles, an American physician, born in Caswell co., N. C., May 14, 1772, died in Louisville, Ky., July 9, 1853. He was the son of an emigrant Irish officer. In 1792 he went to Philadelphia, and joined the medical classes of the university. Here he applied himself earnestly to study and practice, and during the yellow fever of 1793 distinguished himself by ability, courage, and zeal. He acted as surgeon to a brigade during the whiskey insurrection. In 1795 he published a translation of Blumenbach's "Elements of Physiology," from the Latin. He succeeded Nicholas Bidle as editor of the "Port Folio," and in 1816 edited Cullen's "Practice of Physic," while at the same time he filled the chair of natural history in the university of Pennsylvania. In 1819 he published the "Life and Campaigns of General Greene," and soon after became professor of medicine and clinical practice at the Transylvania university, Lexington, Ky. In 1820 he made a tour in Europe to purchase books and philosophical apparatus for that institution. In 1837 he established in the city of Louisville a medical institute, but, in consequence of a misunderstanding with the trustees, was removed from office in 1849. He passed his latter days in Louisville, engaged in the composition of his autobiography, which appeared after his death. His works also include "Memoirs of the Rev. Dr. Horace Holley," and "Bachtiar Nameh, or the Royal Foundling, a Persian Tale, translated from the Arabic."

CALDWELL, James, an American clergyman, born in Charlotte co., Va., in April, 1784, killed at Elizabethtown, N. J., Nov. 24, 1781. He graduated at the college of New Jersey in 1759, and in 1762 became pastor of the Presbyterian church in Elizabethtown. He zealously espoused the revolutionary cause, and did much to incite and sustain the spirit of resistance. He was appointed chaplain in the New Jersey brigade, and became the special object of hatred to the tories in that state. In 1780 his church and residence were burned by a marauding party of British troops and tories. Later in the same year, during an incursion of British forces from Staten Island, the village of Connecticut Farms, where his family were

temporarily residing, was overrun and pillaged, and his wife was killed by a musket shot fired into a room where she was praying with her two children. Mr. Caldwell was at this time in Washington's camp at Morristown. He was afterward very active in the defence of Springfield, which was attacked by about 5,000 troops, and is said to have distributed the hymn books from a Presbyterian church among his soldiers for wadding, with the exhortation, "Now put Watts into them, boys." He was shot by James Morgan, an American sentinel, stationed at Elizabethtown Point, during an altercation about a bundle which the sentinel thought it his duty to examine. Much excitement was caused by his death, and the soldier was delivered to the civil authorities, convicted of murder, and hanged, Jan. 29, 1782. A costly monument to the memory of Caldwell and his wife was dedicated at Elizabethtown on the 64th anniversary of the death of the "soldier parson."

CALDWELL, Joseph, D. D., an American scholar, born at Leamington, N. J., April 21, 1778, died at Chapel Hill, N. C., Jan. 27, 1835. He graduated at the college of New Jersey in 1791, and was for the next five years a tutor there. In 1796 he was chosen professor of mathematics in the university of North Carolina, and in 1804 became president and professor of moral philosophy. He went to Europe in 1824 to obtain books and apparatus for the university, and was devoted to its interests till his death. He wrote a "Treatise on Geometry," and a series of letters on internal improvements.

CALEDONIA, the name given by the Romans to that portion of Scotland N. of the Glota and Bodotria, the modern Clyde and Forth, which formed the northern boundary of their province. The Caledonii were of Celtic origin, and are described by Tacitus as having red hair and large limbs, going naked and barefooted, living in tents, subsisting by the chase and pasturing cattle, addicted to predatory warfare, and fighting from chariots with spears, daggers, and shields. There were 21 tribes, which were more or less united in resisting the encroachments of the Romans and in making incursions into Britain. In the year 84 they were defeated under their chieftain Galgacus, by Agricola, in a bloody battle on the Grampian hills, but were never reduced to subjection. At a later period they were known as Picts, from the habit of painting their bodies, and were joined by the Scots from Ireland in their depredations upon lower Britain. Agricola, and after him the emperors Hadrian, Antoninus Pius, and Severus, strengthened the natural boundaries by forts and ramparts against their invasions. The name Caledonii disappears about the beginning of the 4th century; and at a later period the Scots came to predominate over the Picts, and finally gave their name to the country. Caledonia is still used as a poetical designation for Scotland.

CALEDONIA, a N. E. county of Vermont; area, 650 sq. m.; pop. in 1870, 22,247. The

Connecticut river forms its S. E. boundary, separating it from New Hampshire, and several small streams furnish water power for saw and grist mills. Maple sugar is produced in this county in greater quantity than in almost any other in the United States. There are some sulphur springs, and an abundance of granite and limestone. The Connecticut and Passumpsic Rivers railroad traverses it. The chief productions in 1870 were 49,381 bushels of wheat, 68,222 of Indian corn, 355,988 of oats, 49,684 of buckwheat, 466,680 of potatoes, 66,772 tons of hay, 1,246,300 lbs. of butter, 130,295 of wool, 1,158,904 of maple sugar, and 31,910 of hops. There were 5,217 horses, 10,650 milch cows, 12,184 other cattle, 27,142 sheep, and 2,405 swine. Capital, St. Johnsbury.

CALEF, Robert, a merchant of Boston, Mass., died at Roxbury, April 13, 1719. He wrote a book in answer to Cotton Mather's "Wonders of the Invisible World," which he entitled "More Wonders of the Invisible World" (London, 1700). It was denounced in pamphlets and from the pulpit, and was publicly burned in the yard of Harvard college, by order of Increase Mather, then president of that institution. It had great influence, however, in removing the prevalent delusion in regard to witchcraft.

CALENDAR (Lat. *calendarium*, from *calends*, the first day of the Roman month), a method of numbering and arranging days, weeks, months and years, or a mechanical contrivance for registering that arrangement. The day is a natural division of time varying slightly in length, but so slightly that a clock keeping mean or average time seldom differs 15 minutes from the time as given by the sun. Civilized nations usually commence the day at midnight, and count two periods of twelve hours each in the day. Astronomers and navigators since the time of Ptolemy commence the day at noon, and number the hours from 1 to 24.—The week is not a natural division of time, although four weeks are nearly a lunation, and many periods in the animal economy, such as the incubation of eggs, correspond singularly with weeks. The use of the week in eastern nations from time immemorial is by some ascribed to the effect of divine command, as recorded by Moses, and by others to the number of conspicuous planets. Our common names for the days of the week are Saxon in form, but evidently were borrowed originally from some eastern nation, as the gods to whom each day is consecrated correspond in character to those to whom the days were consecrated by the Greeks and Romans, when they adopted the week from the East; for these nations originally had no weeks.—The Greeks divided the month into three equal decades, the Romans into three very unequal periods. The length of the month was suggested, as the word shows, by the moon, which completes her changes in a little less than 30 days. But inasmuch as the solar year does not consist of an even number of lunar months, the months have in

most nations become fixed periods of 80 or 81 days. The length of the month in most civilized nations has been copied from the Romans. No nation has, however, followed the singular division which the Romans made of the month by means of three special days. The first day was called the *calends*, because it was an ancient custom of the pontiffs to call (Lat. *calare*) the people together on that day to apprise them of the festivals or days to be kept sacred during the month. The 18th or 15th day was called the *ides*; the *nones* were the 9th day before the *ides*, and the other days of the month were numbered from the next succeeding *calends*, *nones*, or *ides*. The day, for instance, which we call Feb. 19, they called the 11th before the *calends* of March. The calendar shown in the engraving, found in Pompeii, indicates the number of days, the average length of the days and nights, and the festival or sacred days, in each month.—The solar year is a natural period, formerly measured by the interval be-

MENSIS IANVAR	MENSIS FEBRVAR	MENSIS MARTIVS
DIES XXXI	DIES XXVIII	DIES XXXI
NON QVINT	NON QVINT	NON SEPTMAN
DIES NON VIND	DIES NON VIND	DIES NON XII
NOX NON VIND	NOX NON VIND	NOX NON XII
SOL	SOL	SOL
QVINT CORN	QVINT CORN	QVINT CORN
TVTALA	TVTALA	TVTALA
IVNDNIS	IVNDNIS	IVNDNIS
PALVS	PALVS	PALVS
AGVITVR	AGVITVR	AGVITVR
SALIX	SALIX	SALIX
HAARVND	HAARVND	HAARVND
CAEBITVR	CAEBITVR	CAEBITVR
IACIFICAM	IACIFICAM	IACIFICAM
DIES	DIES	DIES
PENATIBVS	PENATIBVS	PENATIBVS

Calendar from Pompeii.

tween two successive vernal equinoxes. If the civil year corresponds with the solar, the seasons of the year will always come at the same period. But in early times the Roman pontiffs regulated the length of the civil year so imperfectly, that in the days of Julius Cæsar the spring occurred in what the calendar called summer. Cæsar, with the help of Sosigenes, reformed the calendar in 46 B. C., and introduced our present arrangement of having three years of 365 days followed by one of 366, dividing the year into months nearly as at present. The irregularity of alternation in the months of 80 and 81 days was introduced a few years after to gratify the vanity of Augustus, giving his month of August as many days as Julius Cæsar's month of July. The additional day was given in leap year to February, by calling the 5th day before the *calends* of March a second 6th; whence leap year is still called in the almanacs bissextile year (*bis*, twice, and *sextus*, sixth). This calendar of

Julius Cæsar is still used in the Russian empire, and was in use in all Europe till 1582. Its error consists in giving the year a length of 365½ days, which is about 11 minutes too much, an error which has now amounted to about 12 days. Pope Gregory XIII. ordered Oct. 5, 1582, to be called the 15th, and that all centennial years which are not multiples of 400 should not be made leap years; thus 1600 was a leap year, and 2000 will be the next that falls on a centenary year. This is called the Gregorian calendar, and is at present used in all Christian countries except Russia. It is a method of intercalation which reconciles with much accuracy the civil with the solar year. The latter consists of 365 d. 5 h. 48 min. 49.62 sec. The Gregorian rule of omitting three leap years in every 400 years, reducing these to 146,097 days, gives to a civil year an average duration of 365 d. 5 h. 49 min. 12 sec., which exceeds the true solar year by 22.38 seconds, and amounts to the difference of a day only every 8,866 years. The most intricate matter in the calendar is the ecclesiastical rule governing the movable feasts. The council of Nice ordained in the year 325 that Easter should be celebrated on the first Sunday after the full moon that occurs on or next after the day of the vernal equinox. The days of the week are denoted by the first seven letters of the alphabet, A being placed against Jan. 1. The dominical letter for the year is the letter which will then come against Sunday. The solar cycle is a period which restores the first day of the year to the same day of the week, by means of which we can find the dominical letter for any year, and therefore tell what day of the week it was or will be at any given date. The lunar cycle is a period which restores the new moon to the same day of the month. The golden number indicates the place of any given year in the lunar cycle, so that by means of it we can tell on what day of March the full moon falls, and thus find Easter day. The Gregorian calendar, civil and ecclesiastical, was soon adopted in the Catholic states. In the Protestant states of Germany it was but partially adopted in 1700, and not wholly till 1774. The change from Julian to Gregorian reckoning was made by act of parliament in Great Britain in September, 1752, the 8d of the month being called the 14th.—The ancient Egyptians, Chaldeans, Persians, Syrians, Phœnicians, and Carthaginians, each began their year at the autumnal equinox (about Sept. 22). The Jews also began their civil year at that time, but in their ecclesiastical reckoning the year dated from the vernal equinox (about March 22). The beginning of the year among the Greeks until 432 years B. C., when Meton introduced the cycle called after him, was at the winter solstice (about Dec. 22), and afterward at the summer solstice (about June 22). The Greek astronomers had a solar year peculiar to themselves, to the months of which they gave the 12 signs of the

zodiac. The Roman year from the time of Numa began at the winter solstice. It was not probably the original purpose of Cæsar to change this time of the commencement of the year, and his motive for delaying it several days till Jan. 1 was doubtless the desire to make the first year of the reformed calendar begin with the day of the new moon. Among the Latin Christian nations there were seven different dates for the commencement of the year: March 1; Jan. 1; Dec. 25; March 25 (beginning the year more than nine months sooner than we do; this was called the Pisan calculation, and, though unknown in Spain, England, and Germany, was followed in several states till 1745); March 25 (beginning the year nearly three months later than we do; this was called the Florentine calculation, and was much in use from the 10th century till 1745); at Easter; and on Jan. 1 (but one year in advance of us). In France the year began in general at March 1, under the Merovingians; at Dec. 25, under the Carlovingians; and at Easter, under the Capetians. By edict of Charles IX., in 1564, the beginning of the year was ordered at Jan. 1. In England, from the 14th century till the change of style in 1752, the legal and ecclesiastical year began at March 25, though it was not uncommon in writing to reckon it from Jan. 1. After the change was adopted in 1752, events which had occurred in January, February, and before March 25, of the old legal year, would, according to the new arrangement, be reckoned in the next subsequent year. Thus the revolution of 1688 occurred in February of that legal year, or, as we should now say, in February, 1689; and it was at one time customary to write the date thus: February, 1688.—The year of the French revolutionary calendar, which was instituted in 1792, began with Sept. 22. It consisted of 12 months of 30 days each, with five sacred days at the end devoted to festivals, and called the *sansculottides*. The months were divided into three decades of ten days each. Every period of four years was termed a *franciade*, and was terminated by six instead of five festival days. The more accurate adjustment was arranged according to the Gregorian regulation for leap year. The Gregorian calendar was restored in France, Jan. 1, 1806.—The ancient northern nations of Europe began their year from the winter solstice. In the era of Constantinople, which was in use in the Byzantine empire, and in Russia till the time of Peter the Great, the civil year began with Sept. 1, and the ecclesiastical sometimes with March 21, and sometimes with April 1. The beginning of the Mohammedan year, which is lunar, is not at any fixed time, but retrogrades through the different seasons of the solar year. The later Jewish year is lunar, but by the intercalation of a 13th month 7 times in a cycle of 19 years is brought in harmony with the solar periods; it begins at the autumnal equinox. Among most of the peoples of the

East Indies the year is lunar, and begins with the first quarter of the moon the nearest to the beginning of December. Among the Peruvians the year began at the winter solstice, and among the Mexicans at the vernal equinox. The year of the former was lunar, and was divided into four equal parts, bearing the names of their four principal festivals, instituted in honor of their four divinities allegorical of the seasons. The Mexicans had a year of 360 days and 5 supplementary days. They divided it into 18 months of 20 days, and had a leap year. (See CHRONOLOGY, and YEAR.)

CALENDERING (Fr. *calandre*, from Gr. *κλινδρος*, cylinder), the process of finishing cotton and linen goods by passing the cloth between smooth cylinders, which are made to revolve in contact. The term also includes the subsequent operations of cloth-lapping, or folding the cloth, and packing and shipping it, which operations are performed in the same establishment. Paper is also subjected to the finishing process of calendering. The name calender is applied to the machine comprising the rollers which smooth the woven fabrics. Before passing the cloth between them, it is essential that such as is designed for calico printing should be subjected to the singeing process, in order to remove the loose fibres or down. It consists in drawing the cloth rapidly over a horizontal gas pipe, along which numerous little apertures extend in a straight line, so that the gas, ignited, gives a line of flame equal in length to the width of the cloth. Another pipe, placed over this and exhausted of air, draws in the flame through the goods as they pass between the two pipes, and the loose fibres are burned out without igniting the fabric. The movement is at the rate of about three feet in a second. Any sparks that may remain are extinguished as the cloth immediately passes between two rubbers placed in front of the line of flame. A yellow color like that of nankeen is produced by this process, which requires to be removed by bleaching, before printing. As the goods are received by the calender, they are commonly first dampened, whereby the folds and creases are partially removed, and the cloth is better prepared for the succeeding operation. The objects to be attained in calendering are, rendering the surface of the fabric smooth and even by the removal of all wrinkles, the flattening down of all knots and other imperfections, and the spreading of the threads so as to give them a flattened form, and the texture the appearance of closeness and strength. The polish upon cotton goods, called glazing, is produced by the friction they receive in this process. Lawns and muslins of light texture are smoothed in light machines not heated, and with moderate pressure, there being no objection to their threads retaining the cylindrical form, and the fabric its open texture. Fabrics which are to go to the calico printer require a high pressure, and sometimes to be passed twice through the rollers;

but those which have already been partially colored, and are to be filled in with other colors, must not receive that stiffness of finish which would prevent the cloth being stretched one way or the other, whenever it may require slight changes of form, to admit of the exact adjustment of the grounding blocks to the outlines of the colors already applied. — The smoothing calender was introduced into Great Britain from Flanders and Holland during the persecution of the Huguenots. It has been improved by substituting rollers made of pasteboard disks for three of the five commonly employed in the machine, which three were previously constructed of wood, and were consequently liable to warp and crack with the heat to which they were exposed. The other two are hollow cylinders of cast iron, constructed of metal 2 in. thick surrounding the internal cavity of 4 in. diameter; this gives them a diameter of 8 in. The cavity admits of the introduction of a red-hot roller or of steam. The pasteboard cylinders suitable for the iron ones of the dimensions given are two of 20 in. diameter, and two of 14 inches. They are placed in a strong upright iron frame, the small cylinder in the middle and an iron one above and below it, revolving as a cylindrical smoothing iron between the two pasteboard cylinders, which take the place of the domestic ironing board or table with its cover of cloth. The paper rollers are contrived so as to avoid the defects of the wooden ones, and present a smooth surface to the cloth. Set like a wheel upon its axle, a disk of cast iron at the end of a strong iron bar is perforated with six holes near its circumference for as many iron rods to pass through. Circular plates of thick pasteboard, an inch larger in diameter than the intended roller, are next laid upon this disk; they are furnished with holes for the axle and the iron rods. The pile is continued to a length as much exceeding that intended for the roller as the pasteboard disks will shrink by the compression they will be subjected to. A corresponding iron plate is then set upon the other end of the axle, and the rods being passed through and screwed up, the cylinder thus formed is put in a hot apartment or stove to be thoroughly dried for several days, the screws being occasionally tightened upon the rods as the pasteboard shrinks. The surface of the cylinder thus obtained is very hard and close. To turn it down to its proper size is a work of great labor, and the best tools are rapidly dulled. They are necessarily of small size, slowly working down the face of the cylinder, as it revolves at the rate of only 40 or 50 revolutions per minute. When finished, it presents a hardness and polish far superior to that of wood; it also possesses great strength, without the liability of being warped or injured by the great heat to which it is to be exposed. When set in the frame, they are so arranged that they may be forced by levers or screws into very close contact with the iron cylinders.

The cloth, fed from a roll placed opposite the machine, is carried over the upper pasteboard cylinder, between this and the iron one, then between this and the next below, and so on till it has been four times compressed and ironed. The glazing or polishing of the surface is produced by the middle pasteboard cylinder being made to revolve more slowly than the others, and consequently producing a rubbing effect of the cylinders upon the cloth. By this arrangement the former tedious operation of glazing upon a table is rendered unnecessary. A calender contrived by Mr. Dollfus has cylinders of sufficient length to pass through two pieces of cloth at once, and it is also provided with a folding machine, which receives the cloth as it comes out of the rollers, and folds it without the attention of the workmen. By running through two layers of cloth together, one upon the other, the threads of one make an impression upon the other, giving a wiry appearance to the surface. The embossed appearance is produced by rollers of copper, upon the face of which the design is engraved. — The proper folding of the cloth preparatory to its being pressed must, like the other operations of calendering, be carefully conducted, that the appearance of the finished article shall be free from creases and blemishes. When the folds are completed, the pieces are placed, with thin boards and glazed pasteboard between each, in a powerful hydraulic press. While in the press the parcels are corded and prepared for packing in bales. The measure of the cloth has been taken before the folding, either upon the long measuring table, or by folding the cloth from one side to the other and back upon a graduated hooking frame, provided with two needles upon which each fold is suspended.

CALENTURE (Span. *calentura*, fever), the name formerly given to a febrile disease supposed to attack sailors and those living on the coast in tropical climates, and characterized mainly by furious delirium and an irresistible desire to walk into the sea. It is not now regarded as a distinct disease, and the former descriptions of it are thought to have been in great degree fanciful.

CALEPINO, Ambrogio, an Italian lexicographer, born at Bergamo, June 6, 1485, died Nov. 30, 1511. He was of noble birth, and at the age of 16 became an Augustinian monk. He devoted his life to the preparation of a great Latin and Italian dictionary, which was published at Reggio in 1502, and in the 16th and 17th centuries acquired a high reputation, passed through many editions, and was greatly enlarged by successive editors. The edition of Basel (1590–1627) comprised 11 languages, including Polish and Magyar. The last edition was published at Padua in seven languages, in 1772. Calepino was a man of great learning, and from his name was formed the French word *calepin*, which at first meant a dictionary, but now signifies a collection of extracts and notes—a scrap-book.

CALF, the young of a cow, or of the bovine genus of quadrupeds. Whatever breed the calf may spring from, its natural food is milk; coming from the mother in a warm state, it is exactly adapted to the existing condition of her offspring. Milk contains materials for making bone, as phosphoric acid, lime, soda, &c.; for muscle, caseine; for fat, butter or oil, and sugar of milk, as well as a large percentage of water. Some breeders pursue the method pointed out by nature, allowing the calf to run with the dam till weaned; but in most instances this is considered unprofitable, particularly where the object is to secure the largest supply of milk and its products for sale. Thousands of calves are annually slaughtered at two and three days old, when the milk of the cow is considered fit for use, the meat fed to swine or fowls, and the skin sold to the tanner. This wholesale slaughter at so early an age might be avoided by very simple means, and a large increase added to the dairyman's revenue, while the market would be supplied with more good veal and beef, and a greater number of cows would be produced. Some dairymen have selected two or more cows from their herd for the rearing of calves, the latter being removed from their dams when two or three days old, and placed in the pen with the foster mother. Two cows, bearing at different periods, have fattened seven calves in one season. It is necessary that the foster dam have clean, well ventilated quarters, and the best quality of succulent food; in summer, sweet hay, clover, green corn, or rye grass, cut and carried to her, with an occasional feed of corn or oil meal if she and her family are not in a thriving condition. In winter the food should consist of the sweetest of hay, and at least one peck of sliced roots morning and evening, with meal and a little salt sprinkled over them. When an increase of milk is desired, additional quantities of roots or mashies made from meal, or shorts scalded and made thin with water, should be fed. In the natural state, the cow yields milk enough to rear the calf, then ceases to give milk until the next calving. Man has bred cows for milking qualities, rendering both the length of time for giving milk and the quantity given greater than are required for the calf; hence two evils arise: the calf, if left with the cow, is overfed, and her milking qualities are injured. For these reasons a calf should be nursed by a cow kept specially for that purpose, or reared by hand. Robert Colt of Pittsfield, Mass., says: "Take the calves from the cow, and feed them with three quarts of new milk twice a day for three months, adding after they are three weeks old a little rye and corn meal scalded; then wean off upon dry provender, and grass, roots, or hay, as the season may be." Or, "Take the calf directly from the cow, put some dry fine salt in its mouth, and feed on flaxseed jelly and hay tea for one or two months, till the calf is able to eat grass. The jelly is made by boiling one

pint of flaxseed in a gallon of water; pour boiling water over sweet hay and extract its good qualities; the two are then mixed together, about one pint of jelly being used to two gallons of hay tea per day, with an occasional addition of oil meal." This will do in the absence of milk, but cannot be highly recommended. Feeding on sour milk has been tried, and beeves have been produced at one year old of 500 lbs. Calves when taken from cows are usually fed with skim milk, being allowed to suck the fingers immersed in the milk until the habit of drinking is established. The milk must be given blood-warm, and may be enriched by boiled potatoes mashed, or thin mush from Indian corn meal. About 16 to 20 pints per day is the usual quantity of milk. Cold milk is apt to purge the calf; if this occur, the use of one or two spoonfuls of rennet will remove the difficulty. Never overfeed a calf, or it will become pot-bellied and permanently injured. As soon as frost occurs pa the calves, and give sweet hay with a few sliced carrots or other roots, with a little salt. To prove profitable, a calf must show daily improvement, and never suffer the least check in growth. In the isle of Jersey no calves feed from the cow. Mr. Moss of Connecticut has invented a pail with a simple gutta percha teat at the bottom. The pail is filled with liquid food, and suspended in the stall above the calf, which feeds from it as from its dam.—For treatment of diseases, see Youatt and Martin on cattle.

CALHOUN, the name of ten counties in the United States. I. A W. county of West Virginia, intersected by the Little Kanawha river and its W. fork; area, 800 sq. m.; pop. in 1870, 2,939, of whom 8 were colored. The surface is hilly. The chief productions in 1870 were 5,892 bushels of wheat, 52,202 of Indian corn, and 8,857 of oats. There were 496 horses, 666 milch cows, 904 other cattle, 3,232 sheep, and 1,741 swine. Capital, Grantsville. II. A S. W. county of Georgia, intersected by the Ichawaynochaway river and its tributaries, and Spring creek; area, 300 sq. m.; pop. in 1870, 5,508, of whom 3,477 were colored. The surface is level, and the soil fertile. The chief productions in 1870 were 101,517 bushels of Indian corn, and 3,843 bales of cotton. There were 299 horses, 696 mules and asses, 870 milch cows, 2,344 other cattle, 1,394 sheep, and 3,946 swine. Capital, Morgan. III. A W. county of Florida, bordering on the gulf of Mexico, and bounded E. by the Appalachicola river; area, 464 sq. m.; pop. in 1870, 998, of whom 244 were colored. It has a low surface. The chief productions in 1870 were 25,970 bushels of Indian corn, 18,950 of sweet potatoes, 178 bales of cotton, 6,237 lbs. of rice, 13,822 of tobacco, and 8,141 gallons of molasses. There were 1,264 milch cows, 2,356 other cattle, 683 sheep, and 3,641 swine. Capital, Abe's Spring. IV. A N. E. county of Alabama, bounded W. by the Coosa river, and

watered by its tributaries; pop. in 1870, 13,980, of whom 8,892 were colored. The former area was 1,170 sq. m., but portions have been taken to form Cleburne and Etowah counties. The surface is uneven, and in some places mountainous. Chalybeate and other mineral springs are found in many places. Marble and limestone abound, and the ores, among which are gold, lead, and iron, are rich and plentiful. The Selma, Rome, and Dalton railroad passes through it. The chief productions in 1870 were 79,818 bushels of wheat, 238,451 of Indian corn, 29,080 of oats, and 3,038 bales of cotton. There were 1,186 horses, 986 mules and asses, 2,061 milch cows, 3,692 other cattle, 3,441 sheep, and 9,525 swine. Capital, Jacksonville. V. A N. county of Mississippi, intersected by the Looshascoona and Yallahusha rivers; area, about 800 sq. m.; pop. in 1870, 10,561, of whom 2,000 were colored. The chief productions in 1870 were 6,119 bushels of wheat, 803,405 of Indian corn, 81,800 of sweet potatoes, 4,329 bales of cotton, and 127,180 lbs. of butter. There were 1,820 horses, 1,153 mules and asses, 3,186 milch cows, 5,924 other cattle, 5,954 sheep, and 20,945 swine. Capital, Pittsboro. VI. A S. E. county of Texas, including Matagorda island, bordering on the gulf of Mexico, bounded S. W. by Espiritu Santo bay and Guadalupe river, and N. E. by Matagorda and Lavacca bays; area, 684 sq. m.; pop. in 1870, 3,443, of whom 907 were colored. The surface is generally level. The soil is not fertile, and there is little timber. The San Antonio and Mexican Gulf, and the Indianola railroads traverse it. The chief productions in 1870 were 4,165 bushels of Indian corn, 2,432 of sweet potatoes, 248 tons of hay, and 17,490 lbs. of wool. There were 927 horses, 12,931 cattle, and 2,119 sheep. Capital, Indianola. VII. A S. county of Arkansas, bounded S. W. by the Washita river, here navigable by steamboats, and E. by Moro river; area, about 600 sq. m.; pop. in 1870, 3,853, of whom 1,100 were colored. S. E. of the main body of the county, at the junction of the Saline and Washita rivers, is a small portion separated from the rest by Bradley and Union counties. It has a level or rolling surface, and a good soil. The chief productions in 1870 were 102,705 bushels of Indian corn, 13,746 of sweet potatoes, and 2,593 bales of cotton. There were 726 horses, 1,475 milch cows, 2,146 other cattle, 1,634 sheep, and 8,895 swine. Capital, Hampton. VIII. A S. W. county of Michigan, drained by St. Joseph's river and the head waters of the Kalamazoo; area, 720 sq. m.; pop. in 1870, 36,569. It has a rich soil and an undulating surface, mostly occupied by a scattered growth of white and burr oak. Sandstone and water power are abundant. It is traversed by the Peninsular railroad, and by the air-line division of the Michigan Central. The chief productions in 1870 were 741,467 bushels of wheat, 739,832 of Indian corn, 304,872 of oats, 62,866

of barley, 889,788 of potatoes, 47,052 tons of hay, 824,058 lbs. of butter, and 449,651 of wool. There were 8,708 horses, 8,459 milch cows, 9,888 other cattle, 102,010 sheep, and 15,464 swine. Capital, Marshall. IX. A S. W. county of Illinois, occupying a narrow strip of land between the Mississippi and Illinois rivers, the former of which separates it from Missouri, and is joined by the latter at the S. E. angle of the county; area, 260 sq. m.; pop. in 1870, 6,562. Near the river banks the surface is low and frequently inundated; in other localities are high bluffs and table land broken by ravines. In the W. part are valuable coal fields. The chief productions in 1870 were 221,378 bushels of wheat, 284,041 of Indian corn, 26,234 of oats, and 29,980 of potatoes. There were 2,865 horses, 1,710 milch cows, 2,718 other cattle, 1,550 sheep, and 11,069 swine. Capital, Hardin. X. A W. county of Iowa; area, about 600 sq. m.; pop. in 1870, 1,602. The S. and W. parts are drained by Coon river and its tributaries, and the S. fork of Lizard river intersects the N. E. corner. The Dubuque and Sioux City railroad passes through the N. E. part. The chief productions in 1870 were 36,589 bushels of Indian corn, 26,327 of wheat, 14,430 of oats, and 1,149 tons of hay. There were 878 horses, 817 milch cows, 1,060 other cattle, and 679 swine. Capital, Lake City.

CALHOUN, John Caldwell, an American statesman, born in the Calhoun settlement, district of Abbeville, S. C., March 18, 1782, died at Washington, March 31, 1850. His grandfather, James Calhoun, emigrated from Donegal, Ireland, to Pennsylvania, in 1733, when his father, Patrick, was only six years old. The Calhoun family moved to the banks of the Kanawha, in what is now Wythe co., Va. The incursions of the Indians, consequent upon Braddock's defeat, compelled them to a new emigration, and again moving southward they established in 1756 the Calhoun settlement in the upper part of South Carolina, near the Savannah river, in what is now Abbeville county. They were pioneer settlers upon the Cherokee frontier, and were engaged in frequent conflicts with the Indians, in which Patrick Calhoun took a leading part. When the revolution broke out he became an active whig, and was exposed to great danger from the numerous Tories of the neighborhood. In 1770 Patrick Calhoun married Martha Caldwell, born in Virginia, but the daughter of an Irish Presbyterian emigrant. John C. Calhoun, the third son of his parents, was born just at the close of the revolutionary struggle. He showed himself from early boyhood grave and thoughtful, ardent and persevering. He was early taught to read the Bible, and his parents strove to impress upon his mind their own Calvinistic views. At the age of 18 he took to reading history and metaphysics with such application as to impair his health. His father died not long after, leaving the family in moderate circumstances. He

continued to reside with his mother, laboring on the farm, and, though most anxious for an education, determined not to attempt to obtain it till sure of the means without impairing her comforts. In his 19th year he recommenced his studies with a view to the profession of the law, having arranged with his mother and brother that he should be furnished with means to pursue them for seven years. He declared his preference for the life of a plain planter over that of a half-educated professional man. In June, 1800, he entered the private academy of his brother-in-law, Dr. Waddel, a Presbyterian clergyman, and two years afterward joined the junior class of Yale college. He graduated in 1804 with the highest distinction. Dr. Dwight, then president of the college, remarked, after a discussion with him on the origin of political power, "That young man has talent enough to be president of the United States." The next three years he devoted to the study of the law, 18 months of it in the law school at Litchfield, Conn., then the only institution of the kind in the country. In addition to the regular course of study, he cultivated his talent for extempore speaking. He returned to Abbeville to complete his studies, and being admitted to the bar established himself in the old homestead and commenced practice. The country at that time was greatly agitated by the aggressions which France and England, in their desperate struggle against each other, were led to commit on neutral commerce. The controversy with England was rendered still more bitter by her claims to visit American ships in search of British seamen. The outrage upon the American frigate *Chesapeake*, committed under this pretext, in June, 1807, called forth a burst of indignation. In Abbeville, as elsewhere, a public meeting was held to express the feelings of the people. Calhoun was appointed to draw up a report and resolutions. He was soon afterward chosen a member of the state legislature, and in 1811 was elected to congress. In May, 1811, he married his second cousin, Floride Calhoun, with whom he received considerable property. Upon his marriage he removed from the old homestead to Bath, on the Savannah river, a few miles distant. He took his seat in congress Nov. 4, 1811, that body having been called together by the president's proclamation a month before the regular day of meeting. The struggle which had been going on for the three or four years previous in the ranks of the administration party, between those inclined still to promote peace and those in favor of war against Great Britain, was just approaching a crisis. In the election of members of the new congress the war party had gained a complete triumph. They had sent into the house of representatives a number of ardent young men, of whom Calhoun was one, determined to force the administration into the adoption of the war policy. The election of speaker resulted in the choice of the candidate

of the war party by a very decided majority over both the peace and cabinet candidates. Calhoun was placed on the committee of foreign relations. A report from that committee understood to have been drawn by him, distinctly indicated the policy which the majority were determined to pursue. The time had come, as the report asserted, for choosing between tame submission and resistance. By the retirement of the chairman of the committee of foreign relations, Calhoun became its head, and introduced a bill for an embargo of 60 days, as preliminary to a declaration of war. President Madison having sent in a message recommending a declaration of war, Calhoun reëchoed that recommendation in a report from his committee, and followed it up by a bill declaring war against Great Britain. In his report at the next session from the committee of foreign relations, to which had been referred the papers in reference to a suspension of hostilities, he warmly justified the administration in proceeding with the war, notwithstanding the recall of the British orders in council, on the question of impressment alone. He had joined with his colleagues, Cheves and Lowndes, both young men like himself and the former chairman of the naval committee, in urging, among other preparations for war, an enlargement of the navy. He also took decided ground against the whole system of non-impotation and non-intercourse, and assisted by his votes and speeches in getting rid of what remained of it. The action of these young South Carolinians attracted attention in New England, and the idea presently began to be entertained there of a coalition with South Carolina to put down the Virginia dynasty, and what in New England was denounced as its narrow and anti-commercial policy. This feeling was a good deal strengthened by what happened afterward in relation to a national bank. The growing financial distress of the government had led, early in 1814, to the suggestion of such an institution. It was reported against by Eppea, Mr. Jefferson's son-in-law, and chairman of the committee of ways and means, as unconstitutional. This objection Calhoun proposed to evade by limiting the charter to the District of Columbia, but it was not thought by the treasury department that such a bank would answer the purpose. At the next session Alexander J. Dallas, lately appointed secretary of the treasury, proposed a national bank with a capital of \$50,000,000; \$5,000,000 in specie, the rest in government stocks; the government to subscribe two fifths of the capital, and to have the appointment of the president and two thirds of the directors, with power also to authorize a suspension of specie payment; the bank to be obliged to lend the government \$80,000,000, and not to be required to pay specie during the war or for three years after. This scheme was opposed by Calhoun, who proposed to furnish the government with \$45,000,000 by means of a na-

tional specie-paying bank, wholly under private control, and not obliged to lend the government anything. The capital of this bank was to consist of \$5,000,000 of specie and \$45,000,000 of new treasury notes, which it was proposed to get into circulation by making them convertible into bank stock. This project prevailed in the house by a large majority. But Dallas in a labored report denied that new treasury notes to any considerable amount could thus be disposed of. He dwelt also on the injustice and political danger of a scheme which might enable those federal capitalists who had hitherto held back and refused to lend their money to the government to obtain, to the exclusion of the holders of the existing government stocks, the control of a national bank with a capital five times as large as the old bank which the administration party had refused to recharter. These considerations staggered a part of the democratic supporters of the bill, and the federalists, who had supported Calhoun's scheme as against Dallas's, now joining with Mr. Dallas, Calhoun's bill fell to the ground. Thereupon Dallas's scheme was renewed in the senate, where a bill was speedily passed for a non-specie-paying bank on his plan. When this bill came before the house it was vehemently opposed by Calhoun, and was defeated by the casting vote of the speaker, Mr. Cheves. A compromise scheme was then adopted for a bank with \$30,000,000 of capital, \$5,000,000 in specie, \$10,000,000 in stocks created since the war began, and \$15,000,000 in new treasury notes. But the great points of Calhoun's scheme were still preserved: the bank was not obliged to lend to the government, nor permitted to suspend specie payments. The senate wished to substitute the main point of Dallas's plan by vesting a power in the president to authorize a suspension; but the house refused to agree to this, and the bill having quickly passed without any such provision, it was vetoed by President Madison as inadequate to the emergency. The peace which soon followed, attended as it was by great importations of foreign goods, paying the double duties imposed during the war, relieved the immediate wants of the treasury. But both the government and the country were still subjected to great embarrassments by the unequal value and depreciated state of the currency, growing out of the continual suspension of specie payments by the banks south and west of New England. To remedy this evil, the project of a United States bank, which all now agreed should be specie-paying, was revived in the 14th congress, resulting in the charter of the bank of the United States. The conduct of this project through the house was intrusted to Mr. Calhoun. He was chairman of the committee by which the bill was reported, and he asserted in after years that but for his efforts the bank would not have been chartered. He also supported the tariff of 1816, designed to give to the domestic manufactures

which the commercial restrictions, the war, and double duties had called into existence, some safeguard against foreign competition.—Another topic now first prominently introduced into congressional discussion was that of internal improvements. The president, in his annual message, had suggested such roads and canals as could best be executed under the national authority "as objects of a wise and enlarged patriotism." He referred, indeed, to the objection of a want of express constitutional authority, but suggested that any obstacle from that source might easily be removed. This idea was taken up by Calhoun, and at the next session of congress he succeeded in carrying through the house, by a vote of 86 to 84, a bill appropriating a million and a half to be paid by the United States bank, also all dividends upon the seven millions of stock held by the government in that institution, as a fund for internal improvements; each state to be entitled to a share in the expenditure proportioned to its representation in congress, but to be authorized also to consent to the expenditure of its share in any other state. This bill passed the senate, 20 to 15, but was vetoed by the president, on the ground of want of constitutional power in congress to make such appropriations. This occurred just at the close of Madison's term of office (March, 1817), which also brought to a close Calhoun's very active six years' term of service in the house of representatives. Before the next congress met he was called to take a place in President Monroe's cabinet as secretary of war. He now removed his family to Washington, and resided there permanently for the next seven years. In the first congress after Monroe's accession the house resolved, 90 to 75, that congress was empowered to appropriate money for the construction of post roads, military and other roads, and canals, and for the improvement of watercourses; and the secretaries of war and the treasury were directed to report at the next session a list of internal improvements in progress, and a plan for appropriations to aid them. The friends of the resolutions looked up to Mr. Calhoun as their champion in the cabinet against Mr. Crawford, the secretary of the treasury, who denied any constitutional authority for such appropriations of the public money. Mr. Calhoun found the war department in a greatly disorganized condition, with some \$50,000,000 of outstanding and unsettled accounts, and the greatest confusion in every branch of the service. He took means for the speedy settlement of these claims, and drew up a bill, which was passed, for reorganizing the staff of the army. Shortly after his appointment as secretary of war Gen. Jackson was appointed to the command of the southern department, and was sent to take the lead of the forces operating against the Seminole Indians. The orders under which he acted were drawn by Calhoun. Jackson interpreted these orders to give him discretionary authority to do as he pleased;

and acting also, as he afterward alleged, upon a private intimation of the wishes of the administration that he should take possession of Florida, he not only followed the Seminoles into Florida, but seized first upon St. Mark's, and then upon Pensacola. The Spanish minister protested against this violation of the Spanish territory. Calhoun, considering that Jackson had violated his orders, maintained the expediency of bringing him to trial for it. This was warmly opposed by J. Q. Adams, secretary of state, whose opinion prevailed with the president. The question of the signature by the president of the Missouri compromise bill being brought before the cabinet, Mr. Calhoun held the bill to be constitutional, on the ground of a power in congress to prohibit slavery in the territories of the United States, though he was of opinion that such prohibition would remain in force only while the territorial condition lasted, and would not be binding upon any state which might be created out of such territory.—Shortly after the commencement of President Monroe's second term in 1821, the question of the succession became one of leading interest. Calhoun's name was mentioned among others. He was regarded, especially in Pennsylvania, as a statesman of broad views, above mere local or narrow party influences, and disposed, on the question of internal improvements and other questions of national importance, to a liberal construction of the power of the general government. W. H. Crawford was also a candidate for the presidency, and the favorite of the Virginia politicians. But the military exploits of Gen. Jackson, also brought forward as a candidate, made such an impression on the popular mind in Pennsylvania, that the friends of Calhoun judged it expedient for them to withdraw his name and to support Jackson instead. Thereupon Calhoun contented himself with standing for the vice-presidency. As between the presidential candidates, he assumed a position of neutrality; and as the ability with which he filled the office of secretary of war was generally admitted, he obtained nearly the whole of the Adams and Jackson votes, with some of those for Mr. Clay, and was thus elected by a large majority. Upon giving up his office as secretary of war, he removed his family to Pendleton district, now Pickens county, in the extreme northern angle of South Carolina, to an estate called Fort Hill, which had descended to Mrs. Calhoun from her mother, and which continued to be his residence for the rest of his life. Immediately after the choice of Mr. Adams by the house of representatives, through the support of Mr. Clay, a coalition was entered into between the supporters of Jackson and Crawford to oppose the administration of Adams, and, when the election drew near, to support Jackson as his successor. Into this combination Calhoun, though he had been supposed to prefer Adams to Jackson,

entered warmly and became one of its chief leaders. During the whole of Adams's term of office, Mr. Calhoun, though debarred by his position as vice president from any active part in congress, gave his countenance and support to the opposition; and in 1828 he was re-elected vice president on the Jackson ticket, receiving all the votes cast for Jackson except those of Georgia.—The tariff question had for some years past been a leading topic of public interest. Upon this subject there existed a very serious difference among the supporters of Jackson. The middle states were at that time almost unanimous for a protective tariff, while the southern and especially the cotton-growing states were for free trade. Calhoun was the head of this free-trade section of the party, while Mr. Van Buren, then a member of the senate from New York, was conspicuous on the other side. It was by his management and his votes that the tariff bill of 1828 was so amended as to be carried through congress, contrary to the expectation which Calhoun and the free traders had formed, that by adhering to certain provisions desired by the middle states, but disagreeable to the shipping interest of New England, Mr. Van Buren and other middle state senators would keep the bill in a shape to be defeated by the combined vote of New England and the South. Mr. Eaton, a senator from Tennessee, supposed to represent the feelings and opinions of President Jackson, cooperated with Van Buren in this movement, which led Calhoun to doubt whether the president could be relied upon to bring the protective system to an end. Accordingly he began to cast about for other means. He turned his attention to the sovereignty of the states, and, from being charged with being too national, soon after fell under the accusation of pushing the doctrine of state rights to extremes. Building on the Virginia and Kentucky resolutions of 1798-'9, he propounded the doctrine of nullification, that is to say, the right of each state to prevent the execution within her limits of such acts of congress as she might judge unconstitutional. This doctrine he embodied in an elaborate paper, prepared in the summer of 1828, which, being put into the hands of a committee of the South Carolina legislature, and being reported to the house with some softening modifications, was though not adopted by it, ordered to be printed, and became known as the "South Carolina Exposition." At the next session of congress this doctrine of nullification was brought forward in the senate of the United States by Mr. Hayne of South Carolina, in the speech to which Mr. Webster made his famous reply, and in which, though he answered Hayne, he struck through him at Calhoun, who was supposed, though not then certainly known, to be the father of the doctrine. Meanwhile there had occurred a great struggle for influence and predominance with the president between the advocates of the tariff and of free trade. Van

Buren had been appointed secretary of state. Two of Calhoun's friends had seats in the cabinet, but their influence with the president was not so predominating as they had hoped, and the idea was soon started among them of superseding Jackson at the end of his first term and electing Calhoun in his place. This idea was not agreeable to Jackson, and things tended fast toward a rupture. Personal alienation soon followed. Jackson had already sought and soon after obtained a statement from Mr. Crawford of what had occurred in Monroe's cabinet on the subject of the Seminole war. This statement he transmitted to Calhoun, who admitted its substantial correctness. Thereupon Jackson concluded, from this in conjunction with other circumstances, that Calhoun had been at the bottom of the congressional attacks upon him. The next step in this political schism was the establishment at Washington of the "Globe" newspaper, with a design to supersede the "Telegraph," which had been always under the influence of Calhoun, to whom it still adhered. Early in 1831 Calhoun published a pamphlet, with a preliminary address to the people of the United States, containing a body of correspondence in relation to the Seminole affair. But, though sustained by the "Telegraph" and by a few members of congress and a small section of the Jackson party, he was not able materially to diminish the popularity and influence of the president, who soon proceeded to reconstruct his cabinet, Calhoun's friends being requested to follow the example of resigning set by Van Buren. The latter was appointed minister to England, but at the ensuing session of congress, by a coalition between the old opposition led by Clay and Webster and Calhoun's friends, the nomination was rejected, Calhoun presiding, and twice upon ties voting for the rejection. This rejection of Van Buren led to his nomination and election as vice president; whereupon, without waiting for the expiration of his term, Calhoun resigned, and was elected to fill the seat in the senate which Mr. Hayne had vacated to become governor of South Carolina. In the summer of 1831, shortly after the reconstruction of Jackson's cabinet, Calhoun had published an address on the relation which the states and general government bear to each other. In this address he had maintained the right of the states to judge of infractions of the constitution, and in such cases to protect themselves. The greater part of this address was occupied in advocating the free-trade side of the tariff question, and in urging upon congress to take occasion from the paying off of the national debt to reduce the revenue to the level of expenditure, abandoning any attempt at protection beyond that which might be incidental to the collection of such a revenue. But no attention was paid to this advice. The new tariff of 1832 was as protective as the old one. On the application of Governor Hamilton of South Carolina, Calhoun now addressed to him

a long and elaborate letter in defence of his doctrine of state rights, and of its practical efficiency. It was at once determined to act upon this doctrine, and the same legislature which elected Mr. Hayne governor and placed Calhoun in the senate proceeded to authorize a state convention, according to the scheme set forth in the "South Carolina Exposition." That convention had met, and had passed an ordinance, to go into effect on Feb. 1, to nullify the tariff of 1828 and 1832; and when Calhoun took his seat in the senate, December, 1832, the legislature was again in session enacting laws to carry out this nullifying ordinance. The president had issued a proclamation entreating the people of South Carolina to reconsider their position, and announcing his intention to sustain the laws of the United States by force if necessary. He also sent to congress a special message calling for additional legislation to aid him in enforcing the collection of the revenue. This message led to a law which was stigmatized by its opponents as the "force bill," and very warmly opposed by Calhoun and his friends in the senate. He also introduced a series of resolutions on the powers of government, which he sustained in an elaborate speech, Feb. 15, 1833, in support of the right of nullification, which right, taken in connection with the power of amending the constitution by the consent of three fourths of the states, amounted, as he contended, to an appeal in contested cases from the general government to the states themselves, to be decided by a three-fourths vote. Though Calhoun and Clay were not at this time on speaking terms, Calhoun was consulted through a third party as to Clay's compromise tariff of 1833, the passage of which just at the close of the session prevented the impending collision between South Carolina and the general government. He agreed to accept it as an arrangement of the tariff controversy. It provided in fact for a gradual reduction of the revenue, and an abandonment of the protective system at the end of ten years. He spoke and voted for it, though very unwillingly as to some of its clauses, the home valuation clause especially. He spoke and voted against Mr. Clay's bill, passed at the same session, but defeated by the president's veto, for distributing among the states the proceeds of the public lands.—The settlement of the tariff question was speedily followed by the removal, by the president's order, of the public deposits from the bank of the United States, the recharter of which had the year before been defeated by his veto. In the violent struggle in congress, as well as the country, which grew out of that removal, Calhoun joined with Clay and Webster against the administration. In a speech in support of Clay's resolutions condemnatory of the removal of the deposits, he accused the president of attempting to seize on the powers of congress, and to unite in his own hands the sword and the purse. In his view this was a

struggle between a congressional bank and an executive bank, for such was the light in which he regarded the league of banks to which the deposits had been transferred. The bank controversy led to an amalgamation of the national republican opposition, so called, the late supporters of Adams's administration and present friends of Clay, with that fragment of the Jackson party which on state rights grounds had followed Calhoun out of it, but without going the length of nullification. This combined opposition took the name of whigs, assumed by them as indicative of their opposition to executive usurpation. The South Carolina nullifiers—an appellation often reproachfully used, but which Mr. Calhoun did not hesitate to apply to himself—still continued a body by themselves, to which he served as chief; for while cooperating for the next four years with the whigs, he declined to be classed as of their number. In reference to this subject he declared, in one of his speeches, that he had voluntarily put himself in the very small minority to which he belonged to serve the gallant state of South Carolina, nor would he turn on his heel to be placed at the head of the government. He believed that corruption had taken such a hold of it, that any man who attempted reform would fail to be sustained.—The next session witnessed the commencement of the discussions on the subject of slavery. The American anti-slavery society had sent to the southern states, through the mail, tracts and other documents denunciatory of slavery. The arrival of these documents in the south happened to be coincident with a slave insurrection in Mississippi, and also with the nomination of Van Buren to the presidency by a convention of the democratic party held at Baltimore. Complaints were at once raised against this proceeding, as tending, if not intended, to excite the slaves to revolt. Van Buren's nomination had been opposed by a large southern section of the party, which in consequence seceded and nominated as their candidate Hugh L. White of Tennessee. The existence of this northern anti-slavery agitation was strongly urged in the southern states as an objection to voting for a northern candidate for the presidency. Van Buren's political friends in the northern states, by way of relieving their candidate and themselves from any odium on this score, had joined with the mercantile interest in the northern cities in loudly denouncing the abolitionists. It was under these circumstances that the president referred to the subject in his annual message. While testifying to the general feeling of indignant regret which the proceedings of the abolitionists had aroused at the north (to be no doubt, followed up by legislation if needed), he referred to the post office as specially under the guardianship of congress, and suggested a law to prohibit, under severe penalties, the circulation in the southern states through the mail of incendiary publications intended to

instigate the slaves to insurrection. The subject was referred to a special committee, of which Calhoun was chairman. He soon brought in a report, and a bill subjecting to severe penalties any postmaster who should knowingly receive and put into the mail any publication or picture touching the subject of slavery, to go into any state or territory in which the circulation of such publication or picture should be forbidden by the state laws. This report, starting with the doctrine that the states were sovereign as to each other, bound together only by compact, and that the right of internal defence was one of their reserved rights, proceeded to argue that it belonged to the states respectively, and not to congress, as the president's message had assumed, to determine what publications were to be prohibited. The objection taken in the message to the publications in question had been that they were intended to stimulate the slaves to insurrection. The report went far beyond that. It principally objected to these documents that their avowed object was the emancipation of the negroes, a measure which involved not merely a vast destruction of property, but the overthrow of the existing relation between the two races inhabiting the southern states; the only relation, as the report contended, compatible with their common happiness and prosperity, or even with their existence together in the same community. Social and political equality between the races was impossible. To change the condition of the Africans would put them in a position of looking to the other states for support and protection, making them virtually the allies and dependants of those states, and placing in the hands of those states an effectual instrument to destroy the influence of the South and control the destiny of the Union. The object aimed at by the abolitionists was the destruction of a relation essential to the peace, prosperity, and political influence of the slaveholding states. The means employed were organized societies and a powerful press, which strove to promote the object in view by exciting the bitterest animosity and hatred among the people of the slaveholding states against the citizens and institutions of the slaveholding states. Such a proceeding tended to the erection of a powerful political party, the basis of which would be hatred against the slaveholding states, and of which the necessary consequence would be the dissolution of the Union. It was, therefore, not merely the right of the southern states to exclude those publications, but it was also the duty of the northern states, within which the danger originated, at once to arrest its further progress. The bill failed on the final vote, 25 to 19. With respect to petitions for the abolition of slavery in the territories and the District of Columbia, Calhoun held that they ought to be rejected altogether. He took the ground that congress had no jurisdiction over the subject of slavery, in whatever form it might be

presented; no more power over it in the District of Columbia than in the states. The senate, however, decided to receive the petitions and then to reject their prayer. On this latter proposition he refused to vote.—The victory of San Jacinto having introduced into congress the question of recognizing the independence of Texas, Calhoun declared himself not only in favor of that, but of the simultaneous reception of Texas into the Union. On the question of the admission of Michigan, he denied the power of the states to confer on aliens the right of voting, and denounced as revolutionary the action of the people of Michigan in forming for themselves a state constitution without waiting for the consent of congress. He opposed Mr. Benton's resolution to expunge from the journal of the senate the resolution censuring President Jackson for removing the deposits from the United States bank, and voted against the confirmation of Mr. Taney as chief justice of the United States. The great accumulation of public money in the deposit banks had led to extensive purchases of public land by means of money borrowed from those banks, which purchases by increasing the public money on deposit led to new loans and new purchases. The president, just after the close of the late session of congress, had attempted to check this speculation by issuing a circular order to the land offices to receive nothing but gold and silver in payment for public lands. Calhoun denounced this circular as illegal and unconstitutional. Another administration measure was a bill to restrict the sale of the lands to actual settlers in limited quantities. Calhoun opposed this bill as really intended for the benefit of the speculators who had already overloaded themselves with lands, and whose interest it therefore was to restrict further purchases. In the course of his speech he charged that high officers of government and persons closely connected with the president had used these depositories as instruments of speculation in the public lands. President Jackson addressed a letter to Calhoun calling upon him either to retract or to bring his charge before the house of representatives as the basis of an impeachment. Calhoun read this letter in the senate, and spoke of it in very severe terms as a breach of privilege and an attempt to intimidate, and proceeded to repeat what he had said, that many in high places were among the speculators in public lands, and that even an individual connected with the president himself (one of his nephews, whose name he now gave) was a large speculator. He soon after brought forward a plan for the cession of all the public lands to the states in which they lay, to be sold by them at graduated prices extending over a term of 35 years, the states to bear the expenses, and to pay over to the general government a third of their receipts. This proposition received only six votes. Calhoun renewed at this session his attack upon anti-slavery petitions, insisting that they must

be rejected, and that the abolitionists must be silenced, and that not by letting them alone, but by prompt and efficient measures, or the Union could not continue. He refused to admit even by implication that the existing relations between the two races in the slaveholding states was an evil; not only was it a good morally and economically, but it formed the most solid and durable foundation on which to rear free political institutions.—Before the next session of congress a great financial crisis occurred, which Calhoun had foretold as a consequence of the monetary policy pursued during Jackson's second term. Shortly after Mr. Van Buren's inauguration all the banks stopped specie payment. At the extra session which commenced in September, President Van Buren recommended the policy of discontinuing the use of banks as the fiscal agents of the government. He proposed the custody of the public money by officers specially appointed for that purpose, and the exclusive use of coin on the part of the government. Calhoun, separating from the whigs, with whom he had acted in the struggle on the bank question, gave energetic support to this new system of policy. He did the same at the ensuing regular session. This created strong feelings of personal resentment on the part of his late allies, who in the close division of parties could ill spare his vote. Mr. Clay, in replying to Calhoun's speech on the independent treasury bill, not only taunted him with desertion, but made his whole political career the subject of one of those invectives in which he so greatly excelled. Calhoun replied (March 11, 1838); Clay answered on the spot, and Calhoun rejoined. This contest abounded with exemplifications of the different kinds of oratory of which each was master: on the one side declamation, vehement invective, wit, humor, and biting sarcasm; on the other, clear statement, close reasoning, and keen retort. These speeches, apart from their rhetorical merits, are of high historical value, from the light they throw upon the secret history of the compromise of 1833. Calhoun laid great stress upon his, as being the vindication of his public life. In one of his replies to Clay he declared that he rested his public character upon it, and desired it to be read by all who would do him justice. He did not confine himself to defending, but retorted blow for blow. Some sharp passages also occurred between him and Mr. Webster. Previous to this debate he had been involved in another, in which he had almost the whole senate upon him. It was the policy of both political parties to keep the slavery question out of congress, as a subject upon which it was very difficult to speak or act without offending either the North or the South. With this intent both houses had adopted rules, the result of which was that all petitions and memorials on that subject were at once laid upon the table, without being read or debated. The northern whigs had indeed voted against this, con-

tending that all petitions ought to be received and referred to their appropriate committees; but still they were as well satisfied as their opponents to avoid or escape debate. Calhoun did not sympathize in this feeling. From a letter written in 1847 it appears that he had been from the beginning in favor of forcing the slavery issue on the North, believing that delay was dangerous, and that the South was relatively stronger, both morally and politically, than she would ever be again. He now offered a series of resolutions having the same object in view. The chief debate was on the fifth, which declared that the intermeddling of any state or states, or their citizens, to abolish slavery in the territories or the District of Columbia, on the ground that it was immoral or sinful, or the passage of any measure by congress with that view, would be a direct and dangerous attack on the institutions of all the slaveholding states. Mr. Clay moved as a substitute two resolutions, one applying to the district, the other to the territories. These resolutions omitted all reference to the moral or religious character of slavery. For "intermeddling" they substituted "interference." The abolition of slavery in the district was pronounced a violation of the faith implied in the cessions by Maryland and Virginia, and its abolition in any territory a breach of good faith toward the inhabitants, and a ground of just alarm to the slaveholding states, tending to disturb and endanger the Union. Calhoun, though not favoring this amendment, perceiving that the senate would go no further, voted for it. In the course of this debate he stated, in reference to the Missouri compromise, that when it was made he was in favor of it, but that he had since been led entirely to change his opinion, and to regard it as a dangerous measure. He also denied any connection with or knowledge of the existence of any party aiming at disunion. On the contrary, he was seeking to preserve the Union, by opposing injustice and oppression against the weakest and most exposed section of it, in which it was his lot to be cast. He had now become an advocate of the leading measures of the administration, and gave his support to Van Buren as a candidate for reelection, and induced the state of South Carolina to vote for him. To the measures brought forward by the whigs on their accession to power, consequent upon the defeat of Van Buren, he gave his decided opposition, attending, for the first time since his breach with Gen. Jackson, the private caucuses of the democratic members. In an elaborate speech he defended the veto power from the attack made upon it by Mr. Clay, in consequence of President Tyler's veto of the bills for chartering a United States bank. He denounced the tariff of 1842 as not only a violation of the compromise agreed upon in 1833, but, in its details, exceedingly oppressive, and in the circumstances of its enactment worse even than the tariff of 1828. He voted for the Webster-Ashburton treaty with England, and

defended the clauses in relation to the boundary of Maine, and those which referred to the suppression of the slave trade. He opposed the bill for the occupation of Oregon, urging that we had but to wait, and with the progress of our population Oregon would be occupied for us by adventurous settlers; or should there be a struggle, delay was for our benefit, as we were constantly growing relatively stronger.—With March 4, 1843, Mr. Calhoun's senatorial term came to an end. His two great rivals had previously withdrawn from the senate. Webster by accepting a seat in the cabinet, and Clay by resigning. Calhoun had declined a reelection, and did not appear in the next congress. He had been brought forward by his friends as a candidate for the democratic nomination for the presidency, to which party he now considered himself to belong; but he still remained an object of suspicion and dislike to a large section of the party. Instructions having been given to a majority of the delegates to the approaching nominating convention to vote for Van Buren, Calhoun, in February, 1844, addressed a letter to his political friends, severely criticising the principles on which that convention was to be constituted, and refusing to allow his name to go before it. Meanwhile, toward the last of March, 1844, he was unexpectedly called by President Tyler to fill the place of secretary of state. From that office Webster had been ejected as preparatory to a negotiation for the annexation of Texas, and it had again become vacant by the sudden death of Mr. Upshur. The latter had already set the negotiation on foot, and in fact had nearly arranged informally the terms. The Texans had, however, insisted, as preliminary to a formal treaty, upon a pledge that if, pending its negotiation or before its ratification, they should be invaded by Mexico, with which country an armistice had been arranged, the army and navy of the United States should be employed to defend them. This pledge, given by the American minister in Texas, President Tyler had refused to ratify, on the ground that it exceeded his constitutional powers; but as the Texan commissioners positively refused to treat upon any other terms, Mr. Calhoun renewed it. It took but a few days to put the treaty in form, and immediately upon its signature, which took place on April 12, detachments of the army and navy were sent to the frontiers of Texas and the coast of Mexico. The ground of the invitation extended to Texas to renew her application, already three times rejected, for union with the United States, was the apprehension of interference on the part of the British government to procure the abolition of slavery in Texas, as a step toward its abolition in the United States. The facts on which these apprehensions were based had first been brought to the notice of President Tyler through the agency of Calhoun, who was thus the real author of the annexation movement. Lord Aberdeen, in disclaiming

the special facts alleged, or any secret plot for the abolition of slavery in Texas, or any disposition to resort to any measures which would tend to disturb the peace and tranquillity of the slaveholding states, or the prosperity of the Union, admitted however at the same time, as a thing well known both to the United States and everywhere else, that Great Britain desired and was constantly exerting herself to procure the abolition of slavery throughout the world. Shortly after the treaty was concluded, Mr. Calhoun, in replying to this despatch, took the latter admission as an admission also that the British government was laboring to procure the abolition of slavery in Texas, and as having justified on the part of the United States, as a necessary act of self-defence, the treaty of annexation just concluded. The Mexican minister at Washington had given repeated notices that the signature of a treaty of annexation would be regarded by Mexico as an act of war. The American minister at Mexico was directed to disavow any disrespect to that country, or indifference to its honor or dignity, and to represent that the efforts of Great Britain to abolish slavery in Texas had compelled the United States to sign the treaty of annexation without stopping to obtain the previous consent of Mexico. The disposition, however, was expressed to settle all questions which might grow out of this treaty, including that of boundary, on the most liberal terms; and the minister was privately authorized to tender \$10,000,000 to Mexico by way of indemnity. The treaty was sent to the senate April 19, where it was rejected by a vote of 35 to 16. But the treaty had already had the effect to defeat the nomination of Van Buren. He as well as Clay, who was the whig candidate, were opposed to the immediate annexation of Texas, on the ground that it would be equivalent to a war with Mexico. Mr. Polk was nominated by the democrats, and went into the canvass as the advocate of immediate annexation; and having been elected, he was anxious to have the matter acted upon by congress before his accession to office. At the ensuing session joint resolutions were introduced for receiving Texas into the Union. These resolutions could be carried through the senate only by annexing an alternative provision for a negotiation to be opened on the subject with Texas and Mexico (the president to act under either provision as he might deem best), and by means of a promise from Mr. Polk that he would act under the latter provision. In this, however, he was anticipated by Calhoun. Within three days after the passage of the resolutions, and on the last day of President Tyler's term of office, he despatched a messenger to Texas to bring her in under the first provision. Calhoun expected to retain his position as secretary of state; but he was offered instead the place of minister to England, which he declined to accept. He did not, however, retire to private life. One of the South Caro-

lina senators resigned his seat to make room for him, and at the next session (December, 1845) he reappeared at Washington as a senator. In the violent debate at that session on the Oregon question, which threatened to involve a war with Great Britain, he announced himself the decided advocate of compromise and peace, which finally prevailed. The controversy pending with Mexico ended in war. Without waiting for the Mexican people to become reconciled to the treaty, the president ordered the American troops in Texas to take possession of the disputed territory on the north bank of the Rio Grande. When the Mexicans opposed by force this occupation, the president informed congress that our territory had been invaded and that war had been commenced by the Mexicans, and requested that body to recognize its existence and provide for its prosecution. Calhoun spoke against the bill introduced for this purpose, but as the case was hopeless he did not record his name against it. He was, however, utterly opposed to the war thus commenced, both as unnecessary and unjust. At the next session, the American forces having already occupied the northern provinces of Mexico, Calhoun, in his speech on the three-million bill, advocated the policy of abstaining from further invasion. He proposed to hold the country already in possession as a means of forcing the Mexicans to treat, the line of occupation which he recommended being nearly coincident with the boundary afterward obtained, except that it included the peninsula of Lower California. In this speech he declared himself very strongly against any attempt upon the independence of Mexico or the absorption of her inhabited territory. In reply to Mr. Benton's charge that it was he who had plunged the nation into the Mexican war, he accepted the imputation of being the author of the annexation of Texas, but he insisted that the responsibility for the war belonged to the president, who had violated the constitution by marching troops on his own authority into the disputed territory, and by the collision thus brought on had forced congress to recognize as a fact a war which that body could never have been induced to declare or to commence.—The Wilmot proviso (that in any territory acquired from Mexico slavery should be prohibited) having been brought forward in the house as an amendment to the three-million bill, and this proviso having been warmly urged by resolutions adopted by the united vote of both political parties in the legislatures of many of the free states, Calhoun again stepped forward as the leader and champion of the slaveholding interest. He introduced a series of resolutions, in which, starting from the principle that the United States are but the states united, and that the territories are the joint property of those states, he denied that congress had power to make any law which should directly or indirectly deprive any state of its full and equal right in this common

territory. He supported these resolutions, not only in the senate, but in a speech delivered shortly after the adjournment, March 9, 1847, at a meeting of the citizens of Charleston. He maintained in these speeches that the slaveholding states were the conservative balance of the Union, and that it was essential to their own safety and that of the Union that they should continue to have at least an equality in the senate, an equality to be maintained at all hazards. He stated in his speech on offering these resolutions that, though he had always considered the Missouri compromise line a great error, surrendering as it did for temporary purposes the constitutional rights of the South, yet for the sake of peace he would be willing to acquiesce in the extension of that line to the Pacific. In the course of the following summer he wrote the letter in which he developed his policy of "forcing the issue with the North." In this point of view he would regret any compromise or adjustment of the proviso, or even its rejection, without a settlement at the same time of the entire question. He complained in this letter of the recent repeal by Pennsylvania of her law allowing travellers and transient visitors in that state to retain their slaves for a limited term, and of similar repeals in other states. He insisted that the toleration at the North of societies, presses, and lectures which called in question the right of slaveholders to their slaves, and whose object was the overthrow of the institution, could not be acquiesced in without the certain destruction of the relation of master and slave and the ruin of the South. To the question, what remedy there was short of a dissolution of the Union, he replied: "Only one—retaliation." The violation of the constitution on the part of the North must be met by refusing to fulfil stipulations in their favor, of which the most efficient was the cutting off of their ships and commerce from entering into southern ports. But, to make this measure effectual, all the southern seaboard and gulf states must join in it, for which purpose a convention of the southern states was indispensable.—At the ensuing session of congress, the city of Mexico being then in the possession of Gen. Scott, Calhoun submitted (January, 1848) a resolution that to conquer Mexico and to hold it as a province, or to incorporate it with the Union, would be a departure from the settled policy of the government, in conflict with its character and genius, and subversive in the end of our free and popular institutions. News having soon arrived that a treaty was signed, he warmly opposed the ten-million bill and all other measures looking to a continuation of hostilities. He opposed a bill, introduced on the recommendation of the president, to occupy Yucatan, both for the protection of the white population, who, in danger of extermination by the Indians, had sent to ask assistance, and in order to prevent that country from becoming the colony of some European power.

In this speech he explained the origin and objects of the so-called Monroe doctrine, which was assumed by the advocates of the bill as the settled policy of the country. That he denied Mr. Monroe's declarations were made for a temporary purpose, and had never been acted upon. He saw no advantage to be expected from Yucatan at all commensurate with the cost of its acquisition and the burden of its defence. As to the question of protecting the white race there against the Indians, it was not clear that the war in Yucatan was a war of races, or that the whites were blameless in the matter. Moreover, there was a tendency in all the Spanish American republics to a conflict of the same kind between the whites and the Indians. "Are we to declare now by our acts that in all these wars we are to interpose, by force of arms if need be, and thereby become involved in the fate of all these countries? Ought we to set such a precedent? No. The first duty of every nation is to itself, and such is the case preëminently with the United States. They owe a high duty to themselves—to preserve a line of policy which will secure their liberty. The success of their great political system will be of infinitely more service to mankind than the ascendancy of the white race in the southern portions of this continent, however important that may be." In his speech (June 27, 1848) on the bill to organize the Oregon territory, he warmly opposed the extension to that territory of the anti-slavery provision of the ordinance of 1787. He not only denied any power in congress to exclude slavery from the territories, but in still stronger terms any power to do it on the part of the inhabitants or legislatures of the territories. He started in this speech the suggestion that the constitution of the United States, extending into the territories acquired from Mexico, operated to repeal the Mexican laws abolishing slavery. In a second speech he insisted that if the South wished to save the Union, or save herself, she must arouse to instant action, such as would evince her fixed determination to hold no connection with any party in the North not prepared to enforce the guarantees of the constitution in favor of the South.—In the election struggle between Gen. Taylor and Mr. Cass, Calhoun does not appear to have taken much interest. At the short session following the election of Taylor he was very busy in efforts to form a union of the slaveholding states, irrespective of all preëxisting party differences, to resist the progress of abolition. For that purpose a series of meetings was held, at which none but slaveholding members were present, and attended at times by 70 or 80 members, a part of whom were, however, not favorable to the object of the meeting. At the first meeting a committee of 15, one from each state, was appointed to report resolutions. This committee appointed a sub-committee of five, at the head of which was Mr. Calhoun. He drafted

and reported an address, which after some modification was adopted and signed by 48 senators and representatives. It reiterated the same ground of complaint urged by Mr. Calhoun at the previous session, and proposed the same remedy. The union of the South might bring the North to a pause, a calculation of consequences, and a change of measures; if not, the South would stand justified in resorting to any measure necessary to repel so dangerous a blow, without looking to consequences. At the next session, pending the discussion of Clay's compromise scheme, Calhoun, who had been for some time laboring under severe pulmonary disease, to which was now added disease of the heart, prepared an elaborate written speech, which was read for him (March 4, 1849) by another senator. He declared in this speech his belief from the first that the agitation of the subject of slavery would, if not prevented by some timely and effective measure, end in disunion. It had, however, gone on till the Union was palpably in danger. The question now was, how can the Union be preserved? The agitation of the slavery question and the many aggressions to which it had given rise was, no doubt, one cause of the existing southern discontent; but back of that lay another and more potent one. The equilibrium which existed between the two sections of the Union when the constitution was framed had been destroyed, and the South was every day sinking in the scale. This had been brought about by federal legislation in excluding the South from the common territory, and overburdening her with taxes; to which was to be added a radical change in the character of the federal government, by which it had concentrated all the powers of the system in itself, and had been transformed from a federal republic, as it originally was, into a great national consolidated democracy. That equilibrium could only be restored by an amendment of the constitution. That amendment he did not specify in this speech, but from his posthumous treatise "On the Constitution and Government of the United States" it would appear to have been the election of two presidents, one from the free, the other from the slave states, each to approve of acts of congress before they could become laws. His speech attracted much attention, and was answered by Webster and Cass. It was on March 13, in some parenthetical replies to the latter, that Calhoun spoke in the senate for the last time. He fell back in his seat exhausted, and was taken to his lodgings and his bed, whence he never rose again.—The following is Mr. Webster's estimate of him, delivered in the senate when his death was announced there: "The eloquence of Mr. Calhoun was a part of his intellectual character. It grew out of the qualities of his mind. It was plain, strong, wise, condensed, concise; sometimes impassioned, still always severe. Rejecting ornament, not often seeking illustration, his

power consisted in the plainness of his propositions, in the closeness of his logic, and in the earnestness and energy of his manner. No man was more respectful to others; no man carried himself with greater decorum, no man with superior dignity. I have not in public nor in private life known a more assiduous person in the discharge of his duty. He seemed to have no recreation but the pleasure of conversation with his friends. Out of the chambers of congress he was either devoting himself to the acquisition of knowledge pertaining to the immediate subject of the duty before him, or else he was indulging in those social interviews in which he so much delighted. His colloquial talents were singular and eminent. There was a charm in his conversation not often found. He delighted especially in conversation and intercourse with young men. I suppose there has been no man among us who had more winning manners in such an intercourse and such conversation with men comparatively young. I believe one great power of his character in general was his conversational talent, and that, along with confidence in his integrity and reverence for his talents, it largely contributed to make him so endeared an object as he was to the people of his state. He had the basis, the indisputable basis of all high character, unspotted integrity and honor unimpeached. If he had aspirations, they were high, honorable, and noble; nothing grovelling, low, or meanly selfish came near his head or his heart. Firm in his purposes, patriotic and honest as I am sure he was in the principles he espoused and in the measures he defended, I do not believe that, aside from his large regard for that species of distinction that conducted him to eminent stations for the benefit of the republic, he had a selfish motive or a selfish feeling." As a private citizen, Calhoun was highly amiable and exemplary, enjoying the devoted love of his own family and dependants, and the entire respect and sincere regard of his neighbors. He had ten children—three daughters who died in early infancy, and five sons and two daughters who survived him. His political views were often gloomy; but in private life he was uniformly cheerful. He entered into the enjoyments of those around him with a sympathy and kindness that endeared him to all. He was fond of promoting innocent mirth, and, though no jester himself, laughed heartily at the jests of others. He was fond of reading, and in his youth devoted much of his leisure to it, but neither his multifarious occupations nor his cast of mind permitted him to be a general reader. He, however, enjoyed good poetry, good novels, and able reviews. He was not wealthy, but his pecuniary means, under his excellent management, were amply sufficient for the wants of his family. Though not musical, he was fond of Scotch and Irish songs and ballads. He rose early, and devoted his mornings to writing. He walked a great deal

over his plantation, personally superintending its minutest operations. He was the first or one of the first in that region to cultivate successfully small grain and cotton for market; and he not only had the finest melons, figs, peaches, and other southern fruits, but his apples, pears, cherries, grapes, strawberries, raspberries, &c., were equally excellent. He was not only fond of agriculture, but an eminently good and successful planter. His servants were in all respects well treated. They came to him as umpire and judge. Of their private crops he purchased what he wanted at the highest market price, and gave them every facility for disposing of the rest. A rigid justice regulated his conduct toward them, which they repaid by devoted affection; and this system of management was so successful that to have been an overseer at Fort Hill was a high recommendation. He was an excellent shot, and till his eyesight failed generally carried a gun as he walked round his place, rarely missing his aim. In person he was tall and slender. His countenance at rest was strikingly marked by decision and firmness; in conversation, or when speaking, it became highly animated and expressive. His large, dark, brilliant, penetrating eyes strongly impressed all who encountered their glances. When addressing the senate he stood firm, erect, accompanying his delivery with an angular gesticulation. His manner of speaking was energetic, ardent, rapid, and marked by a solemn earnestness which inspired a strong belief in his sincerity and deep conviction. Upon every subject he was acute, analytical, and original, dealing almost exclusively in argument. His style was forcible, clear, and condensed. He very rarely indulged in tropes and figures, and seldom left any doubt as to his meaning. He himself noted it as a peculiarity of his mind, and one that interfered with his influence over passing events, that he was disposed to follow everything out to its ultimate results, disregarding its immediate, temporary, and accidental bearings. His works have been collected and edited by Richard K. Crallé (6 vols. 8vo, New York, 1853-'4). The first volume contains a disquisition on government, and a discussion on the laws relative to the government of the United States, which he left behind him unfinished.

CALICO PRINTING. The term calico (from Calicut, on the Malabar coast, whence it was first imported) is applied in England to white or unprinted cotton cloth, but in the United States to cotton cloth upon which colored patterns are impressed with the use of dyes, technically called prints. The effect produced by the printing process is like that of the colored designs brought out by the loom, but with much greater economy of time and labor. The origin of this art, like that of dyeing, is traced back to very remote antiquity, and in some form or other appears to have been practised by nations of little skill in other respects. The aborigines of northern America stain their gar-

ments of different colors, which is a rude method of calico printing; while the natives of Mexico, at the time of its conquest by Cortes, produced garments of cotton adorned with figures in black, blue, red, yellow, and green colors. Pliny's account of the process practised by the ancient Egyptians is particularly interesting for showing the skill attained by them in the art, as also for describing with great conciseness the principle of the common operations: "They take white cloths and apply to them, not colors, but certain drugs which have the power of absorbing or drinking in color; and in the cloth so operated on there is not the smallest appearance of any dye or tincture. These cloths are then put into a caldron of some coloring matter, scalding hot, and after having remained a time are withdrawn, all stained and painted in various hues. This is indeed a wonderful process, seeing that there is in the said caldron only one kind of coloring material; yet from it the cloth acquires this and that color, and the boiling liquor itself also changes according to the quality and nature of the dye-absorbing drugs which were at first laid on the white cloth, and these stains or colors are moreover so firmly fixed as to be incapable of removal by washing. If the scalding liquor were composed of various tinctures and colors, it would doubtless have confounded them all in one on the cloth; but here one liquor gives a variety of colors according to the drugs previously applied. The colors of the cloths thus prepared are always more firm and durable than if the cloths were not dipped into the boiling caldron." In the different countries of India the art is practised with various degrees of skill. In some the patterns are drawn with a pencil upon the fabric; while in Mesopotamia, as stated by Mr. Buckingham, blocks are employed for producing an impression, as practised by the English block-printers. The Chinese also have long used the same process. The large chintz counterpanes, called palampours, of an ancient East India fabric, are prepared by placing on the cloth a pattern of wax and dyeing the parts not so protected. From India it appears the art was introduced at an early period into Europe; but it never became of much importance till some time in the 17th century, when Augsburg became celebrated for its printed cottons and linens. From this city the art spread into France, Germany, Switzerland, and Great Britain, being introduced into London about the year 1676. Here, being greatly restricted by the opposition of the silk and woollen weavers, it made but slow progress. In 1720 the wearing of printed calico was prohibited by act of parliament, under a penalty of £5 for each offence on the part of the wearer and of £20 on that of the seller. In 1730 it was allowed to be printed, provided the warp was of linen and the weft only of cotton; but even then it was subject to an onerous tax of 6d. per square yard. In 1774 the restriction

upon the manufacture was repealed; but a tax of 8d. per yard was continued, which was increased in 1806 to 3½d. In 1831 this duty was repealed; and the art, which had sustained itself under all the attempts to keep it down, now that it was relieved of the burden of paying an average of 50 per cent. on the goods produced for home consumption, suddenly received a great impetus, so that in place of 8,300,000 pieces of goods manufactured in 1830, the production was increased within 20 years to about 20,000,000. The character of the goods was greatly improved, as well as the processes and machinery; while the cost of production was much reduced by the enormous quantities manufactured. The process of printing had been by wooden blocks, each one of which of a few inches square was applied by hand, impressing a portion of the figure upon the surface in a single color, and another block subsequently applied in the same spot to fill in another portion of the figure in another color. This process was soon nearly superseded by immense machines constructed with the greatest ingenuity, capable of producing 15 or even 20 colors at once with the same precision as in the case of the simpler machines which printed only two or three colors at once, while at the same time 600 or 700 times as many pieces were produced per day as if they had been blocked separately with the same number of workmen employed. The art has been perfected by the highest chemical talent, as well as by the ingenuity of the mechanic and the taste of the artist. Artists or pattern designers are especially employed, whose constant occupation is to furnish new patterns, from which the printer selects those he judges most likely to be popular. The French artists are admitted to produce finer designs than the English, while the latter nation claims a superiority in the mechanical departments of calico printing.—The preparatory operations to which the cloth is submitted before printing have been in part described in the articles BLEACHING and CALENDERING. Printing involves numerous operations of great diversity, of which but a mere outline description can be here attempted. The colors employed are of two different kinds: first, those which are applied directly to the cloth by blocks or plates upon which the patterns are engraved; such colors are prussian blue, madder lake, indigo, and most of the aniline or coal-tar colors. The second kind are such as are produced by the use of mordants which fix the colors in the cloth; such are madder, cochineal, logwood, sumach, several mineral pigments, and the recently discovered dye obtained from coal tar, artificial alizarine, the mordant being sometimes applied separately, and sometimes mixed with the pigment; in the latter case, as when most of the colors of the first kind are used, the goods are usually steamed. (See DYEING, and MORDANTS.) The mordants chiefly used in calico printing are those in which the

acid and base are not held together with a very strong affinity, that the latter may readily unite with the fibre of the cloth, or with the substance or portion of the substance which may follow. The acetates of alumina, of lime, of iron, and of lead are used, the last being the mordant for producing the chromate of lead. Alum, nitrate of alumina, and several of the salts of tin are among the substances which are used as mordants. The old method of printing by blocks is still practised in some parts of the process. The cloth is spread upon the surface of a smooth table covered with a blanket, and receives the impression of the figure, or a portion of it, by the application by hand of the block of wood, upon which the pattern is cut in relief. The surface thus printed varies, according to the size of the block, from 9 to 10 in. in length, and from 4 to 7 in. in breadth. The cloth is moved along the table as fast as printed, and the colors transferred from the block dry upon it, as it is suspended in folds upon rollers. The blocks are sometimes made by raising the pattern with slips of copper inserted in the wood, by which they are rendered much more durable, the frequent applications upon the long pieces of cloth soon causing the wooden blocks to lose the distinctness of outline of their designs. Pins in the corners serve to make small holes in the cotton, which mark the points for placing the block the next time. A second or third color is introduced into the pattern by using a second or third block, so engraved as to fill in the vacancies left by the preceding. A modification of the block, called a "toby," has been contrived, by which several colors have been applied at once.—A complicated machine, exhibiting great mechanical ingenuity, was introduced into the French printing establishments in 1834, by M. Perrot of Rouen, by which the block-printing process was rendered much more expeditious than by the ordinary hand method. It was named for its inventor the perrotine. Its construction is too complicated to admit of description. As improved in 1844, it printed variously colored patterns on white ground with the utmost delicacy, and with such economy of labor that two men could print in three colors from 1,000 to 1,500 yards of calico daily; an amount of work which with the ordinary block would require 25 printers and as many tearers (assistants for keeping the colors in order to be received with every impression upon the block).—Copperplate printing was introduced in the works near London about the year 1770. The designs were cut in the flat plates in intaglio, and the color, applied upon the whole surface, was removed from the smooth portion, leaving it in the sunken parts. The stuff received it from these on being pressed into them by such a press as is used for printing engravings on paper. The change from these flat plates to a cylindrical form introduced the method called cylinder printing, the greatest improvement that has ever been

made in the art, the importance of which can scarcely be overrated. In some of its forms, not the most complete, it is stated that a mile of calico can be printed off with four different colors in one hour, and more accurately and with better effect than by hand blocks. One cylinder machine, attended by one man, can perform as much work in the same time as can 100 men with as many assistants. The invention of the machine is commonly attributed to a calico printer named Oberkampf, at Jouy in France, and again to a Scotchman named Bell, who constructed one about the year 1785. But Dr. Muspratt maintains that the latter only is entitled to the credit of it, and that "cylinder printing is purely a British invention." The copper cylinders are from 80 to 40 in. in length, and from 4 to 12 in. in diameter. They are turned from a solid piece of metal bored through the axis, and the pattern is imprinted upon the surface from a steel cylinder called a mill, upon which the pattern is impressed, before the steel is hardened, from another steel cylinder called the die, on which the design has been engraved in intaglio, as the copper finally receives it. The pattern is complete around the circumference of the roller, and each revolution of this exactly repeats it. In large calico print works the engraved copper rollers constitute a very important item in the investment of the capital, the value of the stock of these held by some of the larger print houses being rated even as high as \$200,000. The value of a single one is often from \$25 to \$30. These cylinders, one for each color to be applied to the cloth, are set in a strong frame against the face of a large central drum, made of iron and covered with woollen cloth in several folds, between which and the engraving cylinders the calico is printed as it passes. The color is spread upon the rollers by their revolving each one in contact with an attendant roller, which dips into a trough containing the coloring matter or the mordant properly thickened; thus the engraving rollers receive the color, and impart it as they revolve to the calico pressed between their face and that of the fixed drum. The superfluous color is taken cleanly off by a sharp blade of steel or other metal, against the edge of which the copper roller scrapes in its revolution. To this contrivance the name of doctor is given. By its use only the color required to fill the depressions is left on the rollers, and the excess falls back into the trough. The employment of many engraved rollers in a single machine is attended with great difficulties, arising from the multiplication of all the other attendant parts in the same proportion. The cylinders have different diameters as the pattern requires, and must consequently revolve at different rates of speed. By passing under many rollers, the calico is in danger of being displaced and the regularity of the print disturbed. But when everything is exactly adjusted, the work goes on with beautiful pre-

cision, accomplishing an extraordinary amount of work. In the use of the cylinder machine, particular care is required that the colors and mordants should be brought to the proper consistency by a sufficient quantity of the thickeners or gums employed, so that they may not spread or run into each other; and that the selection of these thickeners should be with reference to the chemical effect that may result from their mixture with the colors. The arrangement of the colors, too, in their order of succession, must be with reference to the effect that one may have by coming in contact with the other on the cloth. The rooms in which the operations are conducted require to be kept at a proper degree of humidity and warmth, the success of the delicate processes depending in great measure upon due attention to these particulars. As the cloth leaves the printing machine, it is drawn over rollers through a hot-air chamber, raised to the temperature of about 200°, in which it is thoroughly dried and the colors become set.—The various methods of preparing and applying the colors and mordants are classed under six or more different styles, viz.: 1, the madder style; 2, the padding style; 3, the topical style, or printing by steam; 4, the resist or reserve style; 5, the discharge style; and 6, the China-blue or pottery style; to which some add the mandarin, in which the color is produced only on silk and woollen fabrics by the action of nitric acid upon the animal tissue. Two or more of these are commonly applied upon the same piece, to produce the various colors of the pattern. Each of these is a complicated process, involving numerous chemical operations, which would require volumes for their full description. The madder style is like that described by Pliny, quoted above. The coloring matter, which may be madder, or almost any organic dyestuff capable of imparting its color to water, and forming an insoluble compound with mordants, is not applied to the cloth, but this is printed with the mordant instead, and the color is afterward brought out in the places to which the mordant has been applied by the ordinary methods of dyeing. By the different engraved rollers, each supplying a different mordant, various shades and colors are afterward brought out by one dye. Before the mordanted cloth is dyed it is hung for some time in airy chambers, in order that the mordants may intimately combine with the fibre. This operation is called ageing, and is recently been abbreviated by a process in which the goods are passed over rollers in a room in which a small quantity of steam is allowed to escape. But before the goods are in a state to receive the dye, it is necessary to remove the portion of the mordant which has not undergone in the drying or ageing that chemical change which renders it insoluble and fixed to the spots to which it is applied; if left, it would spread in the dye beck or vat, and cause the dye to adhere where it should not be seen.

From the material formerly used to effect this removal, which was a warm aqueous solution of cow dung, to which chalk was added if the cloth contained any free acid, the process was called *dunging*. Solutions of phosphate of soda and lime, with a little glue or some other forms of gelatine, have been substituted; and more recently silicate of soda, silicate of lime, and arsenite of soda have been used, and the process is usually called *cleansing*. Not only is the useless portion of the mordant removed by this method, but the material employed as thickening is also dissolved out, and the mordant which remains is the more firmly fixed by uniting with some of the constituents of the dung or of its substitutes. The cloth, after being passed twice through the dung becks, is several times washed in clean water, and is then ready for dyeing. Upon the care with which the dunging operation has been conducted, the delicate effects to be produced in great measure depend. The padding style is practised only with mineral colors. A colored ground is obtained by passing the cloth through a tub containing the mordant, and then between two rollers covered with blanket stuff, which is called the padding machine, and which presses out the superfluous liquid, and then through another similar apparatus which furnishes the color. If the object is to obtain a design on a white or colored ground, the cloth may be first mordanted in one padding machine and then printed in the other; or, as commonly practised, be first printed with one of the solutions, and then be padded or winced in the other. Wincing is the passing of goods back and forth a number of times over rollers placed in the dye becks below the surface of the dyeing liquid. The topical style is that in which the thickened colors and mordants are mixed and applied together to the cloth. These are sometimes permanent without the application of steam; and many cheap goods are sold, principally for exportation, in which the fugitive colors, called *spirit*, *fancy*, or *wash-off* colors, are fixed neither by a mordant nor by steaming; but steam not only makes the color more permanent, but gives to it a brilliancy and delicacy of finish, and is usually employed. It is applied in a variety of methods—by exposing the goods in a cask, steam chest, tight chamber, or receptacle called a *lantern*, or in that commonly used for calicoes, called the *column*, to an atmosphere of steam at the temperature of 211° or 212° F. The column consists essentially of a hollow copper cylinder perforated with numerous holes, placed upright in a small apartment furnished with a flue for the exit of steam. Around the cylinder is rolled a piece of blanket, then a piece of white calico, and afterward several pieces of the printed and dried calico. The steam is then let into the cylinder for 80 or 40 minutes. The resist style is the printing of designs with some substance, as oil or a paste, which will protect the portions it covers from receiving any color, and which may sub-

sequently be removed. They may be of a nature to act mechanically or chemically, and designed to resist the action either of a mordant or a color. The discharge style is producing white or bright figures upon a colored ground, by dissolving out the mordant in goods not yet dyed, or the dye if this has been first applied, and then printing the portions anew with the hand block. Chlorine and chromic acid are commonly used for removing organic coloring matter, and mordants are dissolved by printing with acid solutions. White figures are thus produced upon imitation turkey-red bandanna handkerchiefs by letting a solution of chlorine flow through hollow lead types of the form of the figure, the types in two corresponding plates, one above and the other underneath, being set in a press which contains a pile of 12 or 14 handkerchiefs. The plates are brought together with a pressure of about 800 tons, and this is sufficient to prevent the chlorine water from bleaching the fabric beyond the limits of the types. The China-blue style is a method of forming a pattern, partly of white and partly of different shades of blue, by first printing with indigo in its insoluble state, and then reducing this to the soluble state and dissolving it upon the cloth by immersing it in suitable preparations. In this process the dye is transferred into the substance of the fibres, where it is precipitated in the original insoluble form, and of the same variety of shades that were printed upon the goods. It is very curious that in this process the shades when dissolved do not run together, nor even spread upon the portions left white.—Since the introduction of aniline colors, most of our knowledge of which we owe to the researches of Prof. A. W. Hofmann of Berlin, much of the printing of calico has been done with them; and since the production in 1869 by Gräbe and Liebermann from anthracene, one of the hydrocarbons obtained in the distillation of coal tar, of artificial alizarine, a substance identical in composition with the natural alizarine obtained from madder (see ALIZARINE), the substitution of coal-tar colors is likely to become still more general. The aniline colors are applied topically, the only mordant used being albumen (usually that obtained from dried blood, bleached by the action of ozone) or vegetable gluten, prepared in various ways. After the color has been applied the goods are steamed and washed, and usually steamed a second time. Aniline black, which is obtained by the action of certain metallic chlorides upon aniline oil, is becoming much used in calico printing. To get the best results, pure aniline should be used. The black made by this method is developed upon the cloth itself by exposure subsequent to the printing. The aniline is mixed with nearly equal parts of chlorate of potash, chloride of ammonium, sulphate of copper, and tartaric acid, by means of a starch paste, and printed topically. Then the printed pieces are left 48 hours in a moist atmosphere of a temperature

of about 104° F., and finished by passing through a weak solution of carbonate of soda. The following recipes for printing with artificial alizarine are taken from a valuable pamphlet by Dr. Frederick Versmann. For red: 5 lbs. alizarine paste containing 10 per cent. of alizarine, 16 lbs. thickening, 1 lb. solution of acetate of alumina (10° Baumé), 1½ lb. solution of acetate of lime (16° B.). For pinks, the same compound is used diluted with two or three parts of thickening. For double printing, when deep red is printed on first, the goods must be steamed one hour before the second printing takes place; after the second printing they must again be steamed one hour and exposed to the air 24 hours, when they are passed through one of the following baths at a temperature of 120° to 140° F., remaining in the bath from one minute to one minute and a half: water 250 gallons, chalk 60 lbs., chloride of tin 8 lbs.; or water 250 gallons, chalk 40 lbs, arseniate of soda 10 lbs. The goods are then washed and brightened by three soapings, the first soaping containing chloride of tin, and are also washed between each soaping. For very deep red, twice the above quantity of alizarine paste is used, and nitrate of alumina is added to the mixture. For purple, the following recipe is given: 3 lbs. alizarine paste, 10 quarts purple thickening, 6 oz. solution of pyrolignite of iron (12° B.), 12 oz. solution of acetate of lime (16° B.). The printed goods are steamed for an hour or two, and are then aired for 24 or 36 hours and passed in a padding machine through the chalk and arseniate of soda bath, after which they are washed and given a single soap bath without the tin salt. The thickening for reds is made as follows: 12 lbs. wheat starch, 40 quarts water, 4 quarts acetic acid (6° B.), 1½ lb. gum tragacanth, 3 lbs. olive oil; boil well and stir till cold. The thickening for purple is made with 10 lbs. starch, 27 quarts water, 3 quarts acetic acid, 1½ lb. gum tragacanth, and 2 lbs. olive oil.

CALICUT, a seaport of British India, in the district of Malabar and province of Madras, situated on the Indian ocean, 100 m. S. W. of Seringapatam, in lat. 11° 15' N., lon. 75° 50' E.; pop. about 15,000. The harbor is poor; the situation of the town on the open beach, with neither river nor haven, compels large vessels to anchor 2 or 3 m. from shore in 5 or 6 fathoms of water. The houses are built of sun-dried brick and of teak wood, and are thatched or tiled. There are about 4,000 Portuguese in the town, and their quarter has houses of a superior description. The other inhabitants are chiefly Mapillas, English, and Parsees. This port was the first place in India touched by a European navigator, Vasco da Gama having landed here May 18, 1498. In 1510 the Portuguese were driven away; but in 1513 they were permitted to build a fortified factory. In 1616 the East India company established a British factory. In 1766 Hyder Ali took the town. In 1789 Tippoo Saib de-

stroyed the place, compelling the inhabitants to migrate; but most of them returned after the conquest of the province by the British in 1790. By the treaty of 1792 Calicut was given to the East India company and was incorporated into the British dominions. The chief exports are teak and sandal woods, pepper, cardamoma, ginger, turmeric, wax, and coconuts.

CALIFORNIA, one of the western states of the American Union, situated on the Pacific ocean, between lat. 32° 20' and 42° N., and lon. 114° 20' and 124° 25' W. It is bounded N. by Oregon; E. by Nevada and Arizona, following the Sierra Nevada on the line of lon. 120° W. to lat. 39°, thence S. E. to the river Colorado on the 35th parallel, and thence by the course of that river; S. by the Mexican territory of Lower California; and W. by the Pacific ocean. The outline of this state is very irregular. Its general direction lengthwise is N. W. and S. E., and a line drawn through its centre, following the curves of its eastern and western



Seal of California.

boundaries, would measure about 770 m. The greatest breadth is about 330 m., least breadth 150 m., average about 230 m. In size it is the second state in the Union, its area being 155,981 sq. m., which is exceeded only by Texas; in population it was in 1870 the 24th. It is divided into 51 counties, viz.: Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Humboldt, Inyo, Kern, Klamath, Lake, Lassen, Los Angeles, Marin, Mariposa, Mendocino, Merced, Mono, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Ventura, Tuolumne, Yolo, Yuba. California contains eight cities, viz.: San Francisco, pop. in 1870, 149,478; Sacramento, 16,283; Oakland, 10,500; Stockton, 10,066; San Jose, 9,089; Los Angeles, 5,728; Marysville, 4,738;

San Diego, 2,800. The principal towns are Benicia, Trinidad, Santa Barbara, San Luis Obispo, Monterey, Santa Cruz, Santa Clara, Vallejo, San Rafael, Sonoma, Napa, Mendocino, Humboldt City, and Klamath, all on or near the coast; east of the Coast range, and for the most part among the mines, are Nevada, Shasta City, Downieville, Grass Valley, Nicolaus, Mokelumne Hill, Sonora, Mariposa, San Bernardino, Visalia, Columbia, Placerville, Coloma, and Auburn.—In 1881 the population, exclusive of Indians, was estimated at 23,000. The first federal census in 1850 gave a population of 92,597, but this was very imperfect, most of the returns having been burned; the state census of 1852 gave 264,435; the federal census of 1860, 379,994; that of 1870, 560,247, of whom 349,479 were males and 210,768 females, 350,416 of native and 209,831 of foreign birth, 4,272 colored, and 7,241 Indians. There were 21,784 Indians retaining tribal relations, of whom 8,284 were on reservations and agencies, and 13,500 nomadic. Of the native born, 169,904 were born in California (including 484 Chinese), 83,766 in New York, 16,050 in Missouri, 15,384 in Massachusetts, 12,735 in Ohio, 11,261 in Maine, 11,208 in Pennsylvania, 10,639 in Illinois, 6,605 in Kentucky, 5,367 in Iowa, 5,190 in Indiana, 3,500 in Vermont, 3,086 in Wisconsin, 2,977 in Connecticut, 2,720 in New Hampshire, 2,598 in New Jersey, 2,596 in Maryland, 2,396 in Arkansas; and there were persons born in every state and territory of the Union. Of those of foreign birth, 54,421 were born in Ireland, 48,826 in China, 29,701 in Germany, 17,669 in England, 10,660 in British America, 9,339 in Mexico, 8,068 in France, 4,949 in Scotland, 4,660 in Italy; and there were persons born in about 40 other countries. The density of population was 2.96 to a square mile. There were 128,752 families with an average of 4.35 persons each, and 96,880 dwellings with an average of 5.55 persons to each. The increase of population from 1860 to 1870 was 47.44 per cent. The most remarkable foreign immigration has been from China. Of the total number (63,254) of Chinese in the United States and territories, as returned by the census of 1870, 49,810 were in California. Of the 15,949 immigrants arriving at San Francisco during the year ending June 30, 1870, 14,108 were Chinese. The total number of Chinese arrived in the United States up to Jan. 1, 1871, was 109,502, nearly all of whom entered at San Francisco; 46 arrived prior to 1851, 41,897 between 1851 and 1860, and 68,059 between 1860 and 1871. They consist mostly of male adults, there being very few women among them. There were 24,877 persons 10 years of age and upward who were unable to read, and 31,716 (including 2,853 Chinese and 1,789 Indians) were unable to write; of these, 9,520 were of native and 22,196 of foreign birth. Of those of 21 years and upward unable to read and write, 12,362 were white males, 9,837 white females, 468 colored

males, and 389 colored females. The number of paupers supported during the year ending June 30, 1870, was 2,817, at a cost of \$273,147. Of the total number (991) receiving support June 1, 1870, 354 were of native and 637 of foreign birth. The number of persons convicted of crime during the year was 1,107. Of the total number (1,574) in prison June 1, 1870, 668 were of native and 906 of foreign birth. There were 179 blind, 141 deaf and dumb, 1,146 insane, and 87 idiotic. There were engaged in agriculture 47,863 persons, including 16,281 agricultural laborers, 24,061 farmers and planters, 1,930 stock herders, 1,860 stock raisers, and 298 vine growers; in professional and personal services 76,112, including 569 clergymen, 15,472 domestic servants, 209 journalists, 37,586 laborers (not specified), 1,115 lawyers, 64 metallurgists, 1,257 physicians and surgeons, and 1,953 teachers; in trade and transportation, 33,165; in manufactures and mechanical and mining industries, 81,508, of whom 3,310 were blacksmiths, 7,130 carpenters, and 36,339 miners.—The most striking feature in the physical geography of California is the existence of two great ranges of mountains running N. W. and S. E., and generally parallel, called the Sierra Nevada (snowy range), and the Coast range. The former shoots off from the latter on the south, the snow-capped Mt. San Bernardino, 11,600 ft. high, near lat. 34°, lon. 117°, being the connecting link. Thence it sweeps N. W. to about lat. 38° 45', lon. 120°, whence it extends due N., forming from that point the E. boundary of the state. At the N. end it is again united with the Coast range mountains by a transverse range in which is situated Mt. Shasta, 14,442 ft. high, in about lat. 41° 15'. The Sierra Nevada is by far the more lofty and rugged range, its summit being generally above the region of perpetual snow, and having several passes at a considerable elevation. In California it is 450 m. long and 80 m. wide, with an altitude varying from 5,000 to 15,000 ft. above the sea. Nearly its whole width is occupied with its western slope, which descends to a level of 800 ft. above the ocean; while the E. slope is only 5 or 6 m. wide, and terminates in the great basin, which is from 4,000 to 5,000 ft. above the sea. The sides of the Sierra Nevada to a height of about 2,500 ft. are covered with oak, manzanita, and nut pine, above which, to a height of 8,000 ft., dense forests of coniferous trees appear, which are succeeded by naked granite and snow. From its W. slope it sends off numerous spurs into the interior valley; and among these lies the great gold region discovered in 1848. The main chain attains its greatest general height in its S. portion, where Mt. Whitney rises to about 15,000 ft., and is surrounded by a large group of peaks not less than 13,000 ft. high; while the surrounding country for 800 sq. m. has an elevation of 8,000 ft. Mt. Shasta, in the N. portion, is 14,442 ft. high, and towers

7,000 ft. above all surrounding peaks. It is of volcanic origin, and is visible in every direction for more than 100 m. Other notable peaks are Lassen's, 10,577 ft., of volcanic origin; the Downieville buttes, 8,500 ft.; Pilot peak, 7,800; Castle peak, 13,000; Mt. Tyndall, 14,886; Mt. Brewer, 13,886; and Mt. Dana, 13,277. There are numerous passes in the Sierra Nevada; those most used in travel are the Johnson pass, 6,752 ft. high, in lat. $38^{\circ} 50'$; Henness, in $39^{\circ} 50'$; and Cajon de las Uvas, 4,256 ft., in $34^{\circ} 50'$. The Coast range, as its name indicates, runs along the coast, giving it a forbidding and dangerous rock-bound character. This range averages from 2,000 to 4,000 ft. in height, and is divided in its length by long narrow valleys, the Los Angeles, Salinas, Santa Clara, Sonoma, Napa, and others, and also by the bay of San Francisco. The breadth of the coast mountains (from the Pacific to the great valley of the Sacramento and San Joaquin) does not exceed 40 m. in most parts of the entire length of the state. The valleys in the midst of these coast mountains, some of which are 60 m. long by 10 broad, possess an equable and genial climate. The Monte Diablo range, a division of the Coast range, covers a territory of about 150 m. long and from 20 to 80 m. wide, beginning at San Pablo bay on the north. Monte Diablo itself is 3,881 ft. high. Lying in front of this range are the Contra Costa hills, a marked feature of the scenery to be observed from San Francisco, which extend from the strait of Carquinez S. E. about 50 m., joining the main range near Mt. Hamilton, which is 4,440 ft. high. The chief peaks of the Coast range, besides those already mentioned, are Mt. Ripley, in Lake county, 7,500 ft.; San Carlos peak, in Fresno county, 4,977; and Mt. Downie, in Los Angeles county, 5,675. The mountains of this range are clothed throughout with luxuriant forests, and contain a great variety of minerals, of which some of the most valuable are found in abundance. Between the Coast range and the ocean occur numerous minor ranges and isolated hills, frequently approaching the water's edge, and enclosing a succession of the most beautiful, salubrious, and fertile valleys. To the north the Pacific slope is still more broken with low hills and mountains. The interlocking spurs of the Coast range and Sierra Nevada cover the whole northern end of the state, and give it a very broken and rugged character.—Between the Sierra Nevada and Coast range lies the great basin bearing the double name of the San Joaquin and Sacramento valleys, although really but one geographical formation. This extends N. and S. about 400 m., with an average breadth of from 50 to 60 m., and presents evidences of having once been the bed of a vast lake. It is drained from the north by the Sacramento river, and from the south by the San Joaquin, which, after meeting and uniting in the centre of the basin, break through the Coast

range to the Pacific. At the S. extremity are the Tulare lakes and marshes, which in the wet season cover a large extent of surface. Along the great rivers the valleys are generally low and level, and extremely fertile, rising into undulating slopes and low hills as the mountains are approached on either side, and broken on the east by numerous spurs from the Sierra. At the N. end, between lat. 40° and 42° , is a high table land or plateau, about 120 m. long, and 5,000 ft. above the ocean level, lying between the main chain of the Sierra Nevada and a branch which extends N. W. toward Mt. Shasta. This plateau is an independent basin; its waters do not leave it, but flow into a few lakes where they are absorbed in the sands. The great basin of Utah, a mountainous barren tract of land, having an elevation of 4,000 or 5,000 ft. above the level of the sea, with no outlet for its waters, extends into the S. E. portion of California. This region is exceedingly arid and sterile, and is cut up by numerous irregular ridges of bare, rocky mountains, with intervening valleys of sand and volcanic matter. On the S. E. border of the state is a district about 140 m. long by 70 m. wide which belongs to the Colorado basin, and is known as the Colorado desert on account of its barren, sandy soil and scanty vegetation.—California has a seacoast extending the whole length of the state, amounting, following the indentations, to somewhat over 700 m. The principal bays and harbors, beginning on the south, are San Diego, Santa Barbara, San Luis Obispo, Monterey, San Francisco, Tomales, Bodega, and Humboldt. San Francisco bay, the most capacious and best protected harbor on the W. coast of North America, is nearly 50 m. long (including its extension San Pablo bay) and about 9 m. wide. The entrance to the bay is in lat. $37^{\circ} 48'$, or $122^{\circ} 30'$, through a strait about 5 m. long and a mile wide, and is named Chrysopylos or Golden Gate. The peninsulas which separate the bay from the ocean are from 6 to 15 m. wide; on the S. one is situated the city of San Francisco. At the N. extremity of San Francisco bay, and connected with it, is the smaller bay of San Pablo, about 10 m. in diameter; and E. of this is that of Suisun, about 8 m. long by 4 m. wide. There are two capes, Mendocino, in lat. $40^{\circ} 25'$, said to be the stormiest place on the coast, and Concepcion, in $34^{\circ} 25'$, the S. limit of the cold fogs and cool summers. There are few islands on the coast, and they are small. The Farallones, or Needles, are a small group of seven islands, the nearest of which is about 20 m. W. of the Golden Gate. They consist of bare rugged rocks, which are the resort of large numbers of sea lions and birds. On the southernmost island is a first-class lighthouse. The other islands lie S. of Point Concepcion, the furthest one being about 60 m. from the mainland. They are named San Miguel, Santa Rosa, and Santa Cruz, forming a group about 20 m. from the

mainland opposite Santa Barbara county; San Nicolas, Santa Barbara, Santa Catalina, and San Clemente, which is the most southerly. They are hilly, rocky, and generally sterile. Some of them are used for sheep grazing, and others are the resort of great numbers of seal, otter, beaver, &c.—The Sacramento and San Joaquin are the most important rivers in California, the former having its head springs in Mt. Shasta and its connected spurs in the N. part of the state, and the latter rising in the Tulare lakes on the south; they flow toward each other, the former S. and the latter N., draining the great valley to which they jointly give name, until they finally unite near lat. 38°, turn abruptly W., and flow through Suisun bay into the bay of San Francisco. Nearly all the tributaries of these rivers are small, and flow chiefly from the Sierra Nevada, the principal being the Feather, with three considerable forks, the Yuba, and the American, flowing into the Sacramento, and the Calaveras, Stanislaus, Tuolumne, and Merced, into the San Joaquin. The Sacramento is about 370 m. long, and is navigable for large steamboats at all seasons to Sacramento, 90 m. from its mouth, or 120 m. from San Francisco, and for smaller craft to Red Bluffs, about 150 or 200 m. above Sacramento. The San Joaquin, about 350 m. long, is navigable for ordinary steamers to Stockton, and for small craft during the rainy season to the mouth of the Tulare slough, about 150 m. Kern river, between lat. 35° and 36°, forms the S. boundary of the mining region. The Klamath flows from Oregon through the N. W. corner of the state, with a considerable affluent from the south called the Trinity, and empties into the Pacific. The Salinas, or Buena Ventura, flowing N. into the bay of Monterey, drains the valley between the Coast range and a minor one, called the Morena. The Rio Pajaro, having its outlet near that of the Salinas, and the Eel and Russian rivers on the north, are considerable streams. The Colorado, forming in part the S. E. boundary of the state, is an important river, flowing S. into the gulf of California, and navigable to Callville, 612 m. above its mouth. There are numerous streams of less importance on the S. coast, most of which are lost in the sands before reaching the ocean.—There are few lakes worthy of mention in California. The largest is Tulare, in the S. part of the state, which is very shoal; it is about 38 m. long by 22 wide, though in the wet season it covers a much larger area. Owen's, Kern, and Buena Vista are much smaller lakes, in the same vicinity. Donner lake and Lake Tahoe are small bodies of water much visited by tourists, lying near the E. border of the state N. of San Francisco. Mono, 14 m. long from E. to W. and 9 m. wide, lies in Mono county, E. of the Sierra Nevada. The water, being saturated with various mineral substances, the chief of which are salt, lime, borax, and the carbonate of soda, is intensely

bitter and saline, and of such high specific gravity that the human body floats in it very lightly. No living thing except the larva of a small fly and a small crustacean inhabits this lake, which is sometimes called the Dead sea of California. The other lakes are: Clear, in Lake county, in the W. part of the state, about 10 m. long; and Klamath and Goose lakes, lying partly in Oregon.—The geological survey of the state, under the direction of Prof. Whitney, has been in progress since 1860. Geologically considered, California belongs chiefly to the palæozoic and tertiary epochs. The rocks are principally granite formations of the secondary and tertiary ages; the former occurring in the high mountains, the latter in the valleys. A bituminous slate formation of the tertiary age extends through the state as far N. as Cape Mendocino, above which more recent formations are found. Much of the rock is metamorphic. The Sacramento and San Joaquin valleys are covered with a diluvium from 400 to 1,500 ft. deep. Throughout the coast range serpentine and silicious ferruginous rock occurs in connection with cinabar. No older formation than the cretaceous is found except in the extreme northern part of the state. In the Monte Diablo range the mountain masses are almost wholly made up of cretaceous and tertiary strata, with instances of peculiar local metamorphism. The Contra Costa hills consist principally of cretaceous and tertiary strata, which are irregular in strike and dip. Near San Francisco the hills appear to be composed of an argillaceous sandstone, while jaspery rocks occur in the outskirts. In the coast ranges N. of the bay of San Francisco, while they are generally of similar character to those already described, silicious and jaspery rocks predominate, and serpentine is found in enormous masses. The geology of the S. part of the state is but little known. The Sierra Nevada range consists of a central mass of granite, flanked by metamorphic slates of secondary age. The highest summits and broadest mass of the chain in the S. portion are composed of granite; metamorphic slates, belonging to the E. flank, form the summits of the central portion, while the highest points of the N. portion of the chain are formed of volcanic rocks. The W. flank, at a considerable elevation, is marked at intervals along the Sacramento and San Joaquin valley by undisturbed marine tertiary and cretaceous strata. S. of Sacramento the tertiary strata are well developed, while further N. the cretaceous rests upon the upturned auriferous slates. Upon the cretaceous rest tertiary strata connected with volcanic material. Much of the N. portion of this chain is highly volcanic. In former eras there were probably many volcanoes in the range. Numerous fossil remains have been found in the state. Beds of marine shells have been met with on the shores of San Pablo bay, on the sides of Monte Diablo, and on the slopes of the Sierra Nevada.—The mineralogy

of California presents some marked peculiarities. Of the known mineral species, numbering about 700, only about 100 are found. Silicates, so common in volcanic rocks, and fluor spar and barytes, so abundant in the vein stones of other mining countries, are of rare occurrence. A not less marked feature is presented in the absence of zeolites. The number of minerals that have been successfully worked is exceedingly limited, comprising chiefly gold, mercury, copper, and silver. Of the mineral productions of California gold is beyond comparison the most important, the most remarkable gold fields in the world existing in the state. Though the metal has been found E. of the Sierra Nevada, among the mountains of the coast, and in various other localities, almost the entire product of the state has been derived from the great auriferous belt on the W. slope of the Sierra Nevada, extending from Fort Tejon northward into Oregon, and measuring about 220 m. by 40 wide. The gold deposits of the N. and S. extremities of this belt are of comparatively little importance. The central portion, embracing the W. parts of Mariposa, Tuolumne, Calaveras, Amador, El Dorado, Placer, Nevada, Sierra, and Plumas, and the E. part of Yuba and Butte counties, forms the great gold-mining region. The gold, with rare exceptions, is found in the native or metallic state. It is never perfectly pure, but is always alloyed with more or less silver, and sometimes also with small quantities of other metals. It occurs extensively in two distinct and well defined conditions, viz.: in the solid rock, usually in veins, and in alluvial deposits in the form of minute scales, coarse grains, and larger pieces, more or less water-worn and mixed with the sand and gravel. The former class of deposits are known as auriferous quartz lodes, and the latter as placers. From this circumstance three distinct modes of mining have arisen, viz.: placer, hydraulic, and quartz or vein mining. In the first named, the metal is obtained by washing the auriferous gravel, by which process the gold, owing to its great specific gravity, is speedily separated from the sand and earthy matter. Owing to the simplicity of the process, placer mining was at first chiefly carried on, but has been largely superseded by hydraulic and quartz mining, which require more capital, skill, and complicated machinery. In hydraulic mining a body of water in a compact continuous stream is directed with great force upon banks or walls of auriferous earth and cemented gravel deposits, by means of powerful nozzles. The matter thus loosened, together with the water, is received in sluices in which the gold, having precipitated, is collected, while the worthless débris is carried away. In this manner many large hills have been levelled. The auriferous quartz occurs in veins and ledges, which are very numerous, and have a general N. N. W. and S. S. E. direction, parallel with the central axis of the Sierra Nevada. The

rock is crushed in powerful mills and the gold extracted by amalgamation. The first of these mills were erected in 1851. In 1870 there were 421 (including 8 silver and 5 gold and silver, of which 206 were operated by steam, 196 by water, and 17 by steam and water. The total cost of machinery was \$6,500,000; total number of stamps, 4,673. In addition to the stamps there are several hundred arrastras. These mills are distributed among nearly all the counties of the state; but the most important mining counties are Nevada, containing 79 quartz mills with an aggregate of 742 stamps; Tuolumne, 41 mills; and El Dorado, 40. The most accurate estimate of the gold product of California since the discovery of that metal in 1845 is as follows:

1848..	\$10,000,000	1857..	\$55,000,000	1865..	\$25,500,000
1849..	40,000,000	1858..	50,000,000	1866..	26,500,000
1850..	50,000,000	1859..	50,000,000	1867..	25,000,000
1851..	55,000,000	1860..	45,000,000	1868..	25,000,000
1852..	60,000,000	1861..	40,000,000	1869..	25,000,000
1853..	65,000,000	1862..	34,700,000	1870..	24,000,000
1854..	60,000,000	1863..	30,000,000	1871..	25,000,000
1855..	55,000,000	1864..	26,600,000	1872..	24,000,000
1856..	55,000,000				
Total....					\$951,500,000

Next to gold, probably the most important mining interest of California is the production of quicksilver, which is obtained only from its sulphuret or cinnabar, of which deposits are found at many points; it occurs in the Sierra Nevada and in triassic rocks in the S. portion of the state, but most abundantly in the Coast range. In 1870 there were four establishments for smelting quicksilver, of which two were in Santa Clara co., and one each in Fresno and Lake counties. The capital invested was \$3,500,000; wages paid during the year, \$181,000; value of materials, \$337,800; of products, \$1,027,680. The New Almaden mine, in Santa Clara co., the oldest and most extensive in the state, produced from July, 1850, to December, 1867, 35,333,586 lbs. of quicksilver, or 461,887 flasks, from 214,777,777 lbs. of ore. The total production of the state in 1869 was 33,600 flasks; in 1870, 23,544; in 1871, 31,881. The exports of quicksilver from San Francisco during the five years ending with 1871 amounted to 126,767 flasks, of which 51,346 were to China, 42,391 to Mexico, 11,600 to South America, and 10,740 to New York. Ores of silver abound in various parts of the state, and some of them are very rich; but silver mining has not yet been developed to such a degree as to render it of any considerable importance. Argentiferous galena is mined at numerous localities in San Bernardino, Mono, Alpine, and Inyo counties; the mines of the last named county exceed in productiveness all others within the state. In 1870 there were in the last three counties 8 silver quartz mills, constructed at a cost of \$332,500, besides 5 gold and silver quartz mills in Inyo co. Argentiferous copper ores are found in that part of the state bordering on Arizona, and argentiferous

alena abounds in the island of Santa Catalina. Iron ores of superior quality exist in the Coast range mountains and in other parts of the state, but not generally under circumstances favorable to their reduction. The most valuable deposits are in Sierra co. The ores occur in a belt of metamorphic rocks, and are marked by an entire absence of arsenic, sulphur, phosphorus, and such other substances as tend to deteriorate the quality of the metal. The ores are magnetic, and of the same variety as those from which the best Swedish and Russian iron is made. Iron pyrites, or the sulphuret of iron, is found with gold in many of the quartz veins. Deposits of chromic iron and manganese exist in the Coast range. Copper ore has been found in various localities. Sulphuret of copper, or copper pyrites, is found in auriferous quartz lodes in nearly all the mining counties. Platinum abounds in the lower part of the Klamath valley. In the coast mountains asphaltum exists in immense quantities, and petroleum has been obtained to some extent by tunnelling. Deposits of lead and zinc have been discovered, but are yet undeveloped. Tin ore of a rich quality has been found, also plumbago, cobalt in various ores, a large lode of sulphuret of antimony, chalk, and chromium. Alum exists in Santa Clara and Calaveras counties, and at the Geysers and Owens's lake, where there are hot alum springs. Fine specimens of alabaster, marble, granite, and buhrstone have been obtained. The beautifully variegated Suisun marble occurs in the sandstones of the Pelevo hills. Bismuth, gypsum, and many varieties of precious stones occur throughout the mountains. Fine varieties of porcelain clay exist in many of the mining counties; and clay suitable for making fire brick is found near Benicia. Beds of hydraulic limestone, occupying a position between the sandstones and the shales, occur in the cretaceous strata, but cannot be obtained of sufficient size for use as an ornamental stone.—Of the non-metallic mineral products, the most important are coal, borax, sulphur, and salt. In 1860 valuable deposits of coal were discovered on the N. slope of Monte Diablo, in beds varying in width from 80 to 50 inches. Bituminous coal of good quality is obtained, which is taken by rail to the San Joaquin river, 5 m. distant, and shipped thence by water. In 1870 the shipments to San Francisco amounted to 129,761 tons, and in 1869 to 145,227. Coal also exists in the hills S. of Monte Diablo. In 1859 remarkable deposits of borax, or baborate of soda, were discovered beneath the waters of Borax lake, near the S. extremity of Clear lake. The water of the lake, which generally covers about 100 acres at an average depth of 3 ft., is impregnated with borax. Beneath the water, in a thick layer of mud, borax abounds in crystals, some of which are 3 inches across. This mud has been tested and found to be charged with borax to the depth of 60 ft. There is another borax lake a few miles N. E.

of Clear lake. On the edge of the latter is a group of boiling springs, scattered over an area of about eight acres, lightly charged with boracic acid, soda, and chlorine. These springs discharge about 800 gallons of water per minute. Sulphur occurs in various parts of the state, but most extensively near Clear lake and in Colusa co. Near the former place are immense deposits which yield 70 to 80 per cent. of pure brilliant sulphur. Salt is found at various points. The most extensive works are in Alameda co., near the bay of San Francisco, where the salt annually collected exceeds 10,000 tons. Mineral springs of every variety exist in abundance, some of which are highly esteemed for their medicinal qualities. In San Bernardino valley are numerous warm springs with temperatures varying from 108° to 172°.—The climate of California varies greatly in different parts, irrespective of the great range of latitude, 9½°, through which the state extends. It differs widely from that of the Atlantic slope in the same latitudes, and probably from that of any other country in the world. Properly speaking, California has several climates: the basin of the Sacramento and San Joaquin valleys having one; the western slope of the Coast range, N. of lat. 35°, another; and that portion of the state S. of 35° still another. The climate W. of the Coast range is different from that E. of the same range, which is less than 60 m. in width. At San Francisco the mercury seldom rises above 80° in the dry, or falls below 40° in the wet season. A record of the climate of San Francisco, extending from 1850 to 1872, shows that the greatest degree of cold during that period was in January, 1854, when the mercury fell to 25°. The extreme of heat for the same period was 98° in September, 1852, a very unusual temperature for San Francisco. Snow very rarely falls there, and the winters bear a strong resemblance to the Indian summer of the Mississippi valley. The mercury seldom if ever remains at the freezing point 24 hours together. It is doubtful if any other country in the world has so cool summers and so warm winters, yet there are comparatively great changes in summer days, the mercury sometimes falling to 46° in July, and rising to 87°; variations of from 20° to 80° during 24 hours are not uncommon, yet the mean temperature of the coldest month is only about 10° lower than that of the warmest. The coolness of the summer nights is attributed to the extreme clearness of the atmosphere favoring radiation. The wind blows for a part of each day from the N. and N. W. along the coast nearly the whole year. During eight months of the year the prevailing wind in San Francisco is southwest. This wind commences pouring through the Golden Gate toward noon, and increases in violence and chilliness till late at night. Heavy fogs occur during the night in the months of June, July, and August, but are of rare occurrence in winter, when the winds

are not so strong. The numerous sheltered valleys near the coast are comparatively free from winds and fogs, and have a delicious and equable climate. In the interior the extremes are much greater, the mercury in the Sacramento valley often rising in summer to 110° or 112°, and along the Colorado as high as 140°; but owing to the extreme dryness of the atmosphere, this great heat is much less prostrating in its effect than even a considerably lower temperature on the Atlantic slope, and the nights are never so hot as to prevent sleep. In the Sacramento and San Joaquin basin the mean temperature of the winter is about 4° below that of the coast, and of the summer from 20° to 80° above. The greater heat of summer is supposed to result from the absence of the ocean breezes and fogs, and the cold of winter from the proximity to the snow-capped Sierra Nevada. Southern California is said to possess a better climate than Italy. S. of San Francisco and in the San Joaquin valley frost is rarely known. Roses bloom throughout the winter, and many trees retain their foliage green the year round. The air, peculiarly warm and dry, is wonderfully healthful and highly favorable to consumptives and persons subject to diseases of the throat. For this reason, San Diego, Santa Barbara, San Bernardino, Stockton, and Visalia have become popular winter resorts for invalids. At San Diego (lat. 32° 44', lon. 117° 6') the prevailing wind during ten months of the year is west. The mean temperature for the year and for the seasons at various localities is shown in the following statement:

PLACES.	Spring.	Summer.	Autumn.	Winter.	Year.
San Francisco.	56-6°	60°	59°	51°	56-6°
Sacramento ..	56	69-5	61	46-5	58
Monterey	54	59	57	51	55-5
Santa Barbara	60-46	69-58	65-9	58-38	60-3
San Diego.....	60	71	64-5	52-5	62
Fort Yuma....	73	90	75-5	57	78-5
Humboldt Bay	53	57-5	58	48-5	51-5

California has a rainy and a dry season, the former nearly corresponding to the winter, and the latter to the summer of the Atlantic region. The rains begin at the north early in autumn, but do not fall in the latitude of San Francisco, in any appreciable quantity, until about the middle of December, which is the month of greatest rain. The rainy season terminates toward the end of May. June, July, August, and September are dry, only 2-5 inches of rain having fallen in these months collectively in 17 years. It has been estimated that there are on an average 220 perfectly clear days in a year; 85 days more or less cloudy; and 60 rainy. Observations covering a period of 17 years show the mean fall of rain in San Francisco to be in January, 4-51 inches; February, 8-08; March, 2-76; April, 1-74; May, .82; June, .05; July, .02; August, .01; September, .9; October, .57; November, 2-74; December, 5-37. The average fall, in inches,

for the seasons and the year at different localities is:

PLACES.	Spring.	Summer.	Autumn.	Winter.	Year.
San Francisco.	6-64	.18	3-61	11-08	21-41
Sacramento ..	7-01	.00	2-61	12-11	21-3
Humboldt Bay	18-51	1-18	4-57	15-08	34-34
Fort Yuma....	0-27	1-30	0-58	0-73	2-25
San Diego	2-74	0-55	1-24	5-29	10-68

Snow is very rare on the coast and in the valleys, and never remains for many days except in the Klamath valley, where there is sometimes a month's sleighing during the winter. There are many mining towns high up in the mountains where the snow falls to a great depth, and lies till late in the spring. Hail rarely occurs. A marked phenomenon of the climate is the comparative absence of thunder and lightning. During autumn many of the rivers sink in the sand soon after leaving the mountains in which they rise; the plains and hills are baked hard to the depth of many inches; the grass and herbage, except near springs and in swampy ground, are dried up and burned as brown as the earth they grow upon. Earthquake shocks are quite frequent in California, but rarely so severe as to do any damage. Sand storms, similar to the simoons of Africa, but less dangerous, sometimes occur in the Colorado desert. The climate is remarkably adverse to epidemic diseases. Malarious fevers, but not generally of a severe type, occur in many of the interior valleys. Of the 9,025 deaths reported by the census of 1870, 8,589 were from general diseases, 1,104 from affections of the nervous, 486 of the circulatory, 854 of the respiratory, 1,093 of the digestive, and 816 of the integumentary system.

—California is no less remarkable for its vegetable productions than for its mineral wealth. This is owing rather to the highly favorable climate than to superiority of soil. The soil of the valleys, both on the coast and in the interior, is generally fertile, and consists of a gravelly clay with a rich sandy loam. The greater part of the farming lands lies in the valley of the Sacramento and in southern California. The Sacramento valley contains about 5,000,000 acres, much of which is very fertile and never needs irrigation. Southern California, which includes the San Joaquin valley and its extensions, the Tulare and Kern valleys, together with the parallel counties on the coast, is the garden of the state. Its soil is rich, but needs irrigation. In 1871 90,844 acres were artificially irrigated. All the fruits and cereals of the temperate zones are produced in abundance throughout the state; while in the southern districts nearly all the most valuable products of the tropics are cultivated with success. In many of the southern counties two crops are taken annually from the same field. In 1870 the average yield per acre of the principal crops was: Indian corn, 35-6 bushels; wheat, 19; rye, 38; oats, 35-5; barley, 26-3; buckwheat, 32-5; potatoes, 148; hay, 1-48

tons. The product of barley is greater than that of any other state in the Union, two crops being gathered in a year. Wild oats grow luxuriantly in the Sacramento valley and to the westward; this cures in the dry season and affords excellent fodder. In the San Joaquin valley are some of the finest wheatfields in the world. California wheat is noted for its superior quality in the markets of the United States and Europe. Rye, buckwheat, and Indian corn are little cultivated, the nights being too cold for the last named. Cotton, tobacco, and sugar cane have been cultivated with success, while the marsh lands will produce rice. The sugar beet, which is planted in January, grows to an enormous size and is easy of cultivation; it is said to be much richer in sugar than the beet of France. The manufacture of beet sugar has been undertaken on a pretty large scale, and has met with encouraging success. There is an extensive manufactory near Sacramento, and another at Alvarado. In 1872 the former had 11,600 acres planted with beets, and the latter 500 acres yielding about 12 tons to the acre, while the average yield of sugar is 160 lbs. to each ton of beets. The production of beet sugar promises to become one of the leading industries of the state. The climate is peculiarly favorable to the growth of hops, the yield being about 1,500 lbs. per acre. Chicory grows luxuriantly; there are two manufactories in San Francisco for the preparation of the root to be used as coffee. There is little sward in the state; a few varieties of grass grow on the hillsides. The counties forming the central coast section constitute the chief dairy district. The production of fruits is unparalleled both in variety and amount, and includes apples, apricots, cherries, figs, grapes, lemons, oranges, nectarines, olives, plums, pears, peaches, pomegranates, pineapples, prunes, quinces, bananas, limes, citrons, raspberries, strawberries, blackberries, gooseberries, currants, raisins, almonds, walnuts, chestnuts, &c. Fruits generally attain a much larger size than in the eastern states. In 1872 there were in the state 38,991 orange trees in flourishing condition, 7,881 lemon, 45,655 fig, 38,486 olive, 59,478 almond, and 51,606 apricot trees; besides 2,446,523 apple, 885,821 peach, 356,252 pear, 243,058 plum, and 19,059 prune trees. These, with several other varieties of tropical fruits in the southern counties, are brought to maturity with very little care, and bear abundance of excellent fruit. California is widely celebrated for its production of grapes and wines. There are more than 30,000 acres planted with vines, which grow both in the lowlands and on the hillsides. The average number of vines per acre is about 900, which give an average yield of 800 gallons of wine and 20 of brandy. The grape region extends from the S. boundary about 600 m. northerly, with an average breadth of about 100 m., and includes three distinct wine districts: the southern, or Los Angeles, making

port and other sweet wines, together with some white wines; the Coast range, including Sonoma and Napa counties, producing white and red acid wines, hock, sauterne, claret, &c.; and the foot hills of the Sierra Nevada, making dry wines of excellent quality, sherry, madeira, teneriffe, &c. The wines of California resemble those of Spain, Hungary, and Greece, rather than those of France, Italy, or Germany. Of the total production of wine, 3,092,380 gallons in the United States in 1870, according to the census, 1,804,656 gallons were produced in California; but local returns make the amount several times larger. Raisins are also successfully produced. The production and manufacture of silk form an important branch of industry. The white and black mulberry trees thrive here, attaining a growth in three years equal to that of five years in France, while the yield of leaves is much greater. Two crops of cocoons are raised in the year, in May and July, the whole process requiring six weeks. The extraordinary advantages of climate render artificial heat unnecessary; the cocoones are singularly free from diseases. The number of mulberry trees in the state in 1870, as officially returned, was 1,609,822, and the production of silk cocoons in that year was 8,587 lbs. A silk manufacturing company has been organized in San Francisco.—Next to Australia, California is regarded as the best country in the world for sheep raising. No shelter is needed for the flock, while the fleeces are remarkably heavy and of superior quality. It is said that one third of the wool product is a second crop, clipped in the autumn. In 1870 California produced more wool than any other state in the Union except Ohio. The Angora or Cashmere goat has been successfully introduced into the state; the number in 1870 was 24,097. There were no bees in the state prior to 1850, but they are now kept in large numbers with great success, and the production of honey is very large.—In 1870 there were in the state 6,218,133 acres of improved land, 477,880 of woodland, and 4,781,092 of other unimproved land. The cash value of farms was \$141,240,028, of farming implements and machinery \$5,316,690; wages paid during the year, including the value of board, \$10,369,247; total (estimated) value of all farm productions, including betterments and additions to stock, \$49,856,024; orchard products, \$1,384,480; produce of market gardens, \$1,059,779; forest products, \$566,017; home manufactures, \$301,491; animals slaughtered or sold for slaughter, \$6,112,503; live stock, \$37,964,752. There were 192,278 horses, 17,583 mules and asses, 164,098 cows, 5,944 working oxen, 461,861 other cattle, 2,768,187 sheep, and 441,617 swine. The chief productions were 16,676,702 bushels of wheat, 26,275 of rye, 1,221,222 of Indian corn, 1,757,507 of oats, 8,788,490 of barley, 21,928 of buckwheat, 880,010 of peas and beans, 2,049,227 of Irish and 202,085 of sweet potatoes, 1,853 of clover seed, 13,294 of

flax seed, 551,773 tons of hay, 34 bales of cotton, 11,391,743 lbs. of wool, 7,969,744 of butter, 3,395,074 of cheese, 3,693,021 gallons of milk sold, 1,814,656 of wine, 625,064 lbs. of hops, 31,740 of flax, 3,587 of silk cocoons, 294,326 of honey, and 4,903 of wax. —The flora of California is remarkable for containing the largest and most beautiful coniferous trees in the world, including the mammoth tree, redwood, sugar pine, red fir, yellow fir, and arbor vitæ, which attain to unparalleled sizes. A great part of the Sacramento and San Joaquin valleys, the Colorado desert, the E. slope of the coast mountains, and the Coast range S. of lat. 35° are treeless. Fine forests exist on the Sierra Nevada and the W. slope of the Coast range N. of 35°. The timber of the Sierra is chiefly spruce, pine, and fir; that of the coast, N. of 37°, redwood, and S. of that latitude spruce and pine. There are fine groves of oak on the foot hills of the Sierra Nevada and the coast valleys. The most remarkable of these trees are the mammoth tree (*sequoia gigantea*, Endl.), found only in California, and the redwood (*sequoia sempervirens*, Endl.). The former has been found only in small groves on the Sierra Nevada, at a height of about 4,500 ft. above the sea level. The first known specimens were a cluster of 92 within a space of 50 acres, in Calaveras co., since become a resort of tourists, and named Big Tree grove. Five or six other collections of them have been found: three in Mariposa co., containing 134 trees over 15 ft. in diameter, and nearly 800 smaller ones; one in Tuolumne, and one or two in Tulare co. In all these groves there are many trees from 275 to 376 ft. high, from 25 to 34 ft. in diameter, and of exceedingly graceful proportions; and some of the largest that have been felled indicate an age, by the ordinary mode of reckoning, of from 2,000 to 2,500 years. The dimensions of one tree in the Tulare group were, according to measurements made by members of the state geological survey, 276 ft. high, 106 in circumference at base, and 76 at a point 12 ft. above the ground. The redwood, which bears a strong resemblance to the mammoth tree and is sometimes mistaken for it, frequently grows to a height of 300 ft. and a diameter of 15 ft. It is found on the plains or mountains near the ocean, and grows in large dense groves. The sugar pine (*pinus Lambertiana*) is a magnificent tree in size, and one of the most graceful of the evergreens. It grows about 300 ft. high and 12 ft. in diameter at the base. The wood is free-splitting and valuable for timber. It is found in the Sierra Nevada. Instead of emitting the resinous substance of the ordinary pine, it furnishes a saccharine sap, which by evaporation becomes granulated and crystallized, and has very much the appearance and taste of common sugar. The Douglas spruce (*pinus Douglasii*), the yellow pine (*P. brachyptera*), and the white cedar (*libocedrus decurrens*) are all large trees, growing more than 200 ft. high and 6 or 8 ft. through

at the butt. The nut pine (*P. edulis*), the cones of which contain edible seeds about the size of the kernel of a plum stone, grows on the coast mountains and at the base of the Sierra Nevada, and is of little value. The California white oak is a large, low-branching, wide-spreading tree, with a crooked trunk, and is of no value except for firewood. Among the other trees and shrubs are the evergreen oak, madrona, manzanita, willow, sycamore, bay tree, cottonwood, horse chestnut, live oak, spruce, fir, cedar, and various other trees of commercial value. The almond grows wild in the coast mountains in Santa Clara co. A wild coffee tree, bearing a berry much resembling the real coffee, grows in Calaveras co. Many species of California trees and shrubs, which bear a strong resemblance to species found in the Atlantic states and Europe, are not the same, and many of the trees of other parts of the continent do not grow here. The botany of the state generally presents peculiar characteristics, offering a highly interesting field for scientific investigation. —Of the native quadrupeds of California, the grisly bear is the largest and most formidable. It grows to be 4 ft. high and 7 ft. long, weighing 2,000 lbs. when very large and fat. Other quadrupeds are the black bear, cougar, wolf, wolverene, wildcat, coyote (an animal between a fox and a wolf), moose, elk, antelope, mountain sheep, deer, lynx, fox, badger, raccoon, marmot, hare, rabbit, squirrel, &c. Of fur-bearing animals, the sea and land otter, seal, beaver, and muskrat are found. Of birds, the most remarkable is the California vulture (*ca-thartes Californianus*), the largest rapacious bird of North America, and next to the condor the largest flying bird in the world. Its total length is about 4 ft., and its width from tip to tip of the outstretched wings 10 ft. or more. Other birds are the golden and bald eagle, turkey buzzard, hawks of various kinds, goshawk, owl, raven, shrike, robin, thrush, lark, magpie, jay, woodpecker, humming bird, swallow, grouse, curlew, goose, duck, penguin, pelican, albatross, and various other game and sea birds. Of fishes, there are the sturgeon, bass, mackerel, codfish, crawfish, blackfish, halibut, sharks, trout, salmon, trout, smelts, sardines, salmon, clams, oysters, lobsters, and crabs. In the San Joaquin valley and on the S. coast are extensive ranches where large herds run almost wild, the cattle being branded to indicate ownership. —Among the many remarkable natural curiosities of California is the valley of the Yosemite with its surrounding cascades and mountain peaks. It is situated in Mariposa co., on the W. slope of the Sierra, midway between its E. and W. base, at an elevation of 4,060 ft. above the sea. It is 140 m. in a direct line a little S. of E. from San Francisco, but about 250 by any usually travelled route. Here, within a space of less than 20 m. long and 10 m. wide, is probably presented more grand and beautiful scenery than is found in any similar area in the world. (See YOSEMITE.) By act of con-

gress, the Yosemite valley, embracing 86,111 acres, and the Big Tree grove in Mariposa county, 2,589 acres, have been granted to California to be held for all time as places of public resort. The Geysers are also remarkable natural phenomena. There is a collection of hot sulphur springs, more than 800 in number, covering about 200 acres, in a deep gorge in the N. E. part of Sonoma county. They are about 1,700 ft. above the sea, and are surrounded by mountains from 3,000 to 4,000 ft. high. Hot and cold, quiet and boiling springs are found within a few feet of each other. (See GEYSERS.) There are five natural bridges in California. The largest is on a small creek emptying into the Hay Fork of Trinity river, 80 ft. long, with its top 170 ft. above the water. In Siskiyou co. there are two about 30 ft. apart, 90 ft. long; and there are two more on Coyote creek in Tuolumne co., the larger 285 ft. long. The most noted caves are the Alabaster cave in Placer co., containing two chambers, the larger 200 ft. long by 100 wide; and the Bower cave in Mariposa co., having a chamber about 100 ft. square, reached by an entrance 70 ft. long. The most recently discovered of the great natural wonders of the state is the petrified forest about 75 m. N. of San Francisco, the existence of which was first made public in 1870. Portions of nearly 100 distinct trees of great size, prostrate and scattered over a tract three or four miles in extent, were found, some on the surface and others projecting from the mountain side. The silicified trees appear on examination to have been conifers. Remarkable mud volcanoes exist in the Colorado desert, where the surface is below

the level of the sea. They cover an area a quarter of a mile long by an eighth of a mile wide, consisting of soft mud through which hot water and steam are constantly escaping, while the mud is kept in continuous movement. The mammoth tree groves are entitled to be ranked among the most attractive of natural curiosities. From its great diversities of surface and general physical peculiarities, California presents innumerable examples of picturesque scenery and objects of interest to devotees of nature and of scientific research.—Until within a few years manufacturing industry was confined to those departments required by the more pressing local wants; but recently great enterprise and activity have been manifested in the manufacture of woollen goods, lumber, flour, iron, and glass, besides wine, silk, and sugar, which have been produced to such extent as to form articles of export. The great water power afforded by the mountain streams in the N. and E. parts of the state, and the remarkable productions of the soil, give to California peculiar advantages for manufacturing, which have as yet been but partially developed; but this industry is rapidly increasing in importance. In 1870 the total number of manufacturing establishments was 3,984, employing 604 steam engines of 18,493 horse power, and 271 water wheels of 6,877 horse power. There were employed 25,392 hands, of whom 24,040 were males above 16, 873 females above 15, and 479 youth. The capital invested amounted to \$39,728,202; wages paid during the year, \$13,136,722; value of materials consumed, \$35,851,198; of products, \$66,595,556. The chief industries are shown in the following table:

INDUSTRIES.	No. of establishments.	STEAM ENGINES.		Hands employed.	Capital.	Wages.	Materials.	Products.
		Num-ber.	Horse power.					
Boots and shoes	430	.....	.....	1,526	\$499,354	\$629,873	\$966,952	\$2,214,807
Clothing, men's	103	.....	.....	523	177,508	295,282	470,102	1,090,270
" women's	69	.....	.....	299	174,878	34,200	514,350	738,899
Flouring and grist mill products	115	77	3,406	690	2,590,400	854,998	7,404,951	9,086,886
Gold and silver reduced and refined	2	1	10	85	110,000	35,000	375,000	875,000
Iron castings, not specified	27	28	482	647	775,000	370,845	689,454	1,189,841
" stoves, heaters, and hollow ware	4	5	95	80	122,000	64,000	78,000	190,120
Liquors, distilled	16	2	85	75	386,200	80,789	462,494	1,099,907
" malt	96	22	188	889	1,118,070	227,242	606,215	1,641,174
" vinous	189	2	80	752	668,420	90,659	208,081	602,558
Lumber, planed	23	20	661	407	874,000	290,458	449,500	1,052,000
" sawed	291	184	6,796	4,077	8,356,440	1,620,626	1,956,119	5,227,064
Machinery, not specified	29	24	419	404	766,800	678,283	667,067	1,622,117
" steam engines and boilers	17	13	302	556	564,050	586,645	227,900	1,787,700
Molasses and sirup, refined	3	4	725	255	1,800,000	166,000	3,225,050	8,904,045
Printing and publishing, newspapers	50	4	81	548	848,800	594,572	446,090	1,528,446
Quartz, milled	114	89	1,267	676	1,749,272	436,241	1,927,381	8,405,778
Quicksilver, smelted	4	1	64	258	8,500,000	181,000	887,500	1,027,690
Tobacco, cigars	88	.....	.....	1,384	661,845	523,555	778,426	1,909,917
Woollen goods	5	6	485	659	1,785,000	280,300	608,141	1,102,754

A branch of the United States mint has been in operation in San Francisco since 1854. The total coinage to June 30, 1872, amounted to 36,970,749 pieces, valued at \$347,756,265, of which \$338,026,553 was gold and \$9,729,712 silver. The entire deposits of domestic gold at the mint during this period amounted to \$337,007,047, of which \$227,735,528 was the

production of California. During the year ending June 30, 1872, 3,593,200 pieces, valued at \$26,482,080, were coined, of which \$25,344,840 was gold and \$1,137,240 silver. The deposits of gold amounted to \$25,356,270, and of silver \$1,039,822. This amount exceeds that of any previous year except 1856, when the total coinage amounted to \$28,516,147. The total

amount of domestic gold and silver from California deposited for coinage at the United States mint and branches to June 30, 1872, was \$643,121,449, of which \$642,965,026 was gold and \$156,423 silver. The total amount of gold from California deposited at the United States mint and branches and assay offices during the year ending June 30, 1872, was \$6,892,377; silver, \$75,462. In 1871 there were built in San Francisco 17 vessels of 2,249 tons, of which 12 were sailing vessels, 4 steamers, and 1 barge. There is an extensive navy yard on Mare island, in San Pablo bay, 28 m. above San Francisco, which is the only United States navy yard on the Pacific coast.—The commerce of California is mainly carried on through San Francisco, which is the only port of entry in the state. The number of vessels which entered and cleared during the year ending June 30, 1871, was:

CLASSES.	ENTERED.		CLEARED.	
	No.	Tons.	No.	Tons.
FOREIGN PORTS.				
American vessels.....	177	82,886	246	150,021
Foreign.....	158	104,675	158	98,066
Amer. ocean steamers.....	68	161,610	66	158,878
Foreign ".....	8	2,022	4	2,691
COASTWISE.				
Steamers.....	51	52,174	57	57,376
Sailing vessels.....	121	92,198	143	66,700
Fisheries.....	82	5,902	23	5,764
Total.....	610	508,667	702	589,992

The whole number of vessels registered, enrolled, and licensed was 926, of 133,300 tons, including 720 sailing and 143 steam vessels and 63 barges. The total value of imports from foreign countries was \$20,384,907; domestic exports, \$20,791,414; foreign exports, \$2,856,116. The most important articles of import, with their values, were: silver coin, \$3,567,182; 44,582,721 lbs. of brown sugar, \$2,227,021; 11,892,825 of coffee, \$1,270,245; 398,191 of raw silk, \$2,053,892; 3,612,751 of tea, \$1,233,729; 29,184,429 of rice, \$824,544. The chief domestic exports were 5,903,427 bushels of wheat, valued at \$7,080,510; 287,619 of barley, \$162,107; 198,223 barrels of flour, \$1,173,638; gold bullion, \$2,715,574; gold coin, \$2,502,482; silver bullion, \$3,077,256; and 993,920 lbs. of quicksilver. Among the foreign exports was \$2,316,990 silver coin. The chief countries represented in this commerce were:

COUNTRIES.	Imports from	Domestic exports to	Foreign exports to
Brazil.....	\$44,886	\$187,256	\$24,591
Central America.....	1,185,101	298,697	19,271
China.....	3,921,210	2,774,815	1,719,397
England.....	3,369,868	12,148,586	28,964
France.....	1,849,210	.....	.....
Japan.....	1,873,858	985,240	687,148
Mexico.....	3,681,908	944,891	155,877
Peru.....	676,225	1,653,014	41,989
Russia.....	.....	1,875,698	.....
Sandwich Islands....	901,114	604,424	41,509

The total shipments of domestic commodities from San Francisco to New York via the isthmus of Panama amounted to \$2,060,261, including 5,390,873 lbs. of wool, valued at \$1,116,375; and the foreign, chiefly teas, fur, and skins, \$100,825; while the shipments from New York to San Francisco by this route were valued at \$9,391,607. Shipments of merchandise from San Francisco since 1848 have averaged about \$7,250,000 a year, and the treasure about \$43,000,000, making a total yearly average of \$50,225,000. The shipments of merchandise from San Francisco over the Central Pacific railroad for the first 10 months of 1871, and the corresponding period of the preceding year, were:

ARTICLES.	1870.	1871.
Tea, lbs.....	1,712,271	12,255,774
Coffee, lbs.....	22,500	638,577
Silk, lbs.....	110,698	72,240
Wine, gallons.....	1,011,813	1,697,779
Wool, lbs.....	5,679,264	13,773,841
Salmon, lbs.....	852,219	982,300
Hops, lbs.....	99,823	146,671
Leather, lbs.....	675,390	1,263,779
Furs, lbs.....	870,680	688,800
Glue, lbs.....	45,586	12,547
Quicksilver, lbs.....	.....	15,134
Whale oil, gallons.....	.....	67,267

Cod fishing along the Pacific coast N. of San Francisco is extensively carried on by vessel from that port. In 1870 the number of vessels engaged was 83; lbs. of salted fish obtained, 10,612,000; value, \$754,840. From 1864 to 1870 inclusive 30,958,400 lbs. of salted fish were obtained, valued at \$2,457,414. Four vessels of 853 tons were engaged in the whale fishery in 1870.—In 1860 there were but 23 miles of railroad in the state, but since then the progress in their construction has been rapid. The number of miles in 1865 was 214; in 1870, 925; and in 1873, 1,190. The most important railroad is the Central Pacific extending from San Francisco to Ogden, Utah, where it joins the Union Pacific; 262 miles of this road lie in the state. Its construction was begun in February, 1863, at Sacramento, the portion between that city and San Francisco having been built by another company. It was completed to the state line in January, 1868, and to Ogden in May, 1869. The summit of the Sierra Nevada at the point crossed by this road is 7,042 ft. above the sea. The most important of its branches is the Oregon division, which will extend from Sacramento to the state line, where it will connect with the Oregon and California for Portland. The Southern Pacific will extend from San Francisco to the Colorado river, opposite Arizona, where it will meet the Atlantic and Pacific railroad from St. Louis, Mo. The San Francisco and Northern Pacific will extend from Sausalito on the bay of San Francisco, opposite the city, to Humboldt bay. The Sacramento Valley railroad is the oldest in the state, having been in operation since 1856. The railroads in operation at the beginning of 1873 were:

NAMES.	Capital stock.	Terminal as completed in 1878.	Length, miles.
Central Pacific	\$100,000,000	San Francisco, Ogden, Utah.	262*
" Oregon division .....	.....	Sacramento, Reading.	170
" Branches .....	.....	San Francisco, San José.	50
		Lathrop, Visalia.	152
		Oakland, Brooklyn.	5
California Pacific	12,000,000	Alameda, Hayward.	15
" Branches .....	.....	San Francisco, Sacramento.	90
		Sacramento, Marysville.	57
San Francisco and North Pacific	86,600,000	Napa Junction, Callstoga.	85
Sacramento Valley	1,000,000	San Francisco, Cloverdale.	90
Southern Pacific	70,000,000	Sacramento, Shingle Springs.	49
" Southern Extension .....	.....	San Francisco, Pajaro.	100
Stockton and Copperopolis	1,500,000	Goshen, Tipton.	21
		Stockton, Oakdale.	84

* In the state; total length, 881 m.

Lines of steamships run regularly four times a month from San Francisco to Panama, and monthly to Japan, China, and India, the Hawaiian Islands, Australia, and New Zealand. There is a monthly line to Alaska and a bi-monthly one to Nicaragua, while various lines run frequently to different ports in Mexico, South America, Oregon, and California. The surveys for a ship canal from Stockton to deep water on the San Joaquin river, about 15 m. below, have been completed. There are several lines of telegraph connecting San Francisco with the east and with different parts of the Pacific coast.—In 1872 California contained 13 national and state banks, with an aggregate capital of \$10,900,000; of these 6, with a capital of \$9,050,000, were in San Francisco. There were 20 savings banks, with 58,718 depositors, and deposits aggregating \$47,784,372; 10 of these, with 42,999 depositors and \$40,369,405 deposits, were in San Francisco. In 1871 there were 7 California fire and marine insurance companies, with a capital of \$3,350,000 and accumulations to the amount of \$2,087,967; and 2 life insurance companies, with a paid-up capital of \$100,000; 24 fire and marine insurance companies of other states and countries, with a paid-up capital of \$17,000,000, have agencies in the state, and 35 foreign life insurance companies.—The constitution of California is similar in its general features to those of the older members of the Union. It was adopted Nov. 13, 1849, and has been twice amended. By its provisions, foreigners who are *bona fide* residents are secured the same rights in respect to property as native-born citizens. No public debt shall be created exceeding at any time the sum of \$800,000, except upon a specific vote of the people, and then within certain prescribed limits. Amendments to the constitution must be approved by two sessions of the legislature, between which a general election for assemblymen occurs; and by the people. A convention to revise the constitution may be called by the people, the question having been submitted to them by a two-thirds vote of the legislature. The right of suffrage is conferred on all white male citizens 21 years of age, not convicted of crime or idiotic, resident 6 months in the state and 80 days in the county or district; but by the operation of the 15th amendment to the federal

constitution, colored citizens are entitled to vote. Elections for state officers, members of congress, and of the legislature are held biennially on the first Tuesday in September (odd years); the superintendent of public instruction and the judges are chosen at a special election held in October. A plurality of the votes cast is sufficient for a choice. The legislative department consists of an assembly composed of not more than 80 members nor less than 80, and a senate of not more than one half nor less than one third of the number of assemblymen. There are now (1873) 40 senators who are elected for four years, one half being elected every second year, and 80 assemblymen, elected for two years. The legislature meets biennially in Sacramento on the first Monday in December of the odd years; the session is limited to 90 days, but may be extended by joint resolution. All white male citizens resident one year in the state and six months in the district are eligible to membership. The executive department consists of a governor, lieutenant governor, secretary of state, comptroller, treasurer, attorney general, surveyor general, and superintendent of public instruction, chosen by the people for four years. The qualification of all for eligibility is an age of 25 years or over, and a citizenship and residence in the state of two years. A two-thirds vote of the legislature is required to pass any measure over the executive veto. The judiciary consists of a supreme court with five justices, elected by the people for ten years, having appellate jurisdiction in civil cases where the amount in dispute exceeds \$300, in questions of the legality of taxes, &c., and in criminal cases amounting to felony; district courts (now 17 in number), with one judge each, elected for six years, having original jurisdiction in law and equity in civil cases where the amount exceeds \$200, and unlimited jurisdiction in all criminal cases not otherwise provided for, and in issues of fact joined in probate courts; county courts, consisting of one judge in each county, elected for four years, who performs the duties of surrogate or probate judge, and, with two justices of the peace, holds courts of special sessions; and such a number of justices of the peace in each county, town, city, or village, and with such powers, as the legislature may direct. There is a separate probate

court for San Francisco co., and a criminal court for the city of San Francisco; the judge of the latter is elected for four years. All property, both real and personal, of the wife before marriage, and that acquired by her after marriage, is by the laws of the state her sole and separate property; but the earnings of both wife and husband are common property, except that the earnings of the former are not liable for the debts of the latter. When separate and apart from her husband, the earnings of the wife and those of minor children with her are hers, and she may sue and be sued alone, and convey alone by leave of the court, and married women may dispose of their separate estate by will. A homestead not exceeding \$5,000 in value belonging to a head of family, or \$1,000 to a single person, is exempt from levy on execution. Treason and murder in the first degree may be punished with death; murder in the second degree and robbery from the person with imprisonment from ten years to life; manslaughter, not more than ten years; killing in a duel, one to seven years; mayhem, not over 14 years; rape, from five years to life; arson, one year to life; forgery and perjury, one to 14 years. Indians and Chinese are prohibited from giving evidence in court for or against whites. The immigration of Chinese is discouraged, and special taxes are imposed upon them. Any rate of interest may be legally stipulated for; in the absence of special agreement, the rate is 10 per cent. California has four representatives and two senators in congress, and is therefore entitled to six votes in the electoral college. The laws of the state have recently been revised and arranged under a civil code, political code, code of civil procedure, and penal code, which have been approved by the legislature. The total debt of the state in 1861 amounted to \$4,621,212, and in 1871 was reported by the state treasurer as follows:

FUNDED DEBT.	
Bonds of 1857	\$2,102,000 00
Bonds of 1860	125,000 00
Soldiers' bounty bonds	605,000 00
Soldiers' relief bonds	349,500 00
State capital bonds	250,000 00
Total funded debt	\$3,491,500 00
Warrants outstanding	155,847 00
Grand total, June 30, 1871	\$3,646,347 00

According to the federal census of 1870, the public debt of counties amounted to \$18,817,711, and of towns, cities, &c., \$842,344. The total receipts into the state treasury during the fiscal year were \$3,508,164; of which \$2,166,923 were from direct taxes, \$34,113 from licenses, \$514,003 from lands, \$166,795 from stamps, \$57,196 from commissioners of immigration, \$24,756 from fees, \$191,278 from harbor commissioners, \$244,000 from school fund, \$39,250 from insurance companies, and \$69,850 from miscellaneous sources. The total disbursements from the state treasury were \$3,814,037; of which \$81,659 were for the execu-

tive department, \$277,939 for legislative expenses, \$120,809 for the judiciary, \$30,232 for state library, \$65,000 for printing, \$108,410 for state prison, \$189,597 for asylum for insane, \$54,500 for deaf, dumb, and blind, \$11,030 for industrial school, \$503,067 for educational purposes and schools, \$125,050 for charitable purposes, \$78,779 for lands, \$30,128 for encouragement of manufactures and agriculture, \$273,581 for state capitol, \$89,611 for wharves and docks, \$235,210 for sea wall, \$325,448 for school fund, \$371,542 for interest, \$538,862 for redemption of state debt, \$25,000 for geological survey, \$40,562 for military purposes, \$50,000 for legal tenders, and \$183,071 for miscellaneous purposes. The total taxation not national was: state, \$2,540,383; county, \$5,068,041; town, city, &c., \$208,691; total, \$7,817,115. The assessed value of real estate was \$176,527,160; of personal estate, \$93,116,903; total, \$269,644,068; true value of real and personal estate \$638,767,017. The internal revenue collections in 1871 were \$3,606,921. The advance in the assessed value of property in ten years is shown in the following statement: 1861, \$147,811,617 16; 1862, \$160,369,071 81; 1863, \$174,104,955 07; 1864, \$180,484,949 85; 1865, \$183,509,161 00; 1866, \$200,764,135 50; 1867, \$212,205,339 01; 1868, \$237,483,175 07; 1869, \$260,568,886 08; 1870, \$277,538,134 97. A state lunatic asylum was established at Stockton by act of the legislature in 1853; the buildings are commodious and well arranged with 100 acres of ground handsomely laid out; the number of patients, Oct. 1, 1871, was 1,090, of whom 304 were females; 523 were received during the year, of whom 333 were foreigners. The recoveries are about 47 per cent. of the admissions, and the deaths about 10 per cent. of the whole number treated. The total expenditures for the two years ending Oct. 1, 1871, amounted to \$414,162. A state institution for deaf, dumb, and blind was established at Oakland in 1866. The building, which is 194 by 148 ft., is erected upon a tract of 135 acres. The number of deaf and dumb receiving instruction in 1871 was 65, of whom 26 were females; number of instructors, 3; annual expenditure, \$158,098; number of blind, 33; instructors and other employees, 19; number of blind admitted since the opening, 66; average annual expenditure for five years, \$57,000. A state industrial school was established in San Francisco in 1858, for children of the criminal class; the number of inmates Oct. 1, 1871, was 244, of whom 207 were boys and 37 girls. The state prison is at San Quentin, 12 m. from San Francisco. It contains 453 cells, each 7 ft. long, 4 ft. wide, and 7 high. In 1871 the number of officers and employees was 51; prisoners, 880, of whom 6 were females, 477 native born, and 403 foreigners. The prisoners are employed in cabinet-making, cooperage, brick-making, and harness-making. Instruction is given in the elementary branches. There is a hospital fund provided by the state, which is ap-

portioned to the different counties and expended by the boards of supervisors for the support of the indigent sick; the expenditures from this fund for the two years 1870 and 1871 were \$114,986.—Liberal provisions have been made for education. In 1851 the legislature, in compliance with a provision of the constitution, passed an act establishing a system of public schools. Under this system, outside of the principal cities and towns, but few of the schools were free; in 1864 three fourths of them were partially maintained by rate bills and tuition. In 1867 they were made entirely free. There is a superintendent of public instruction, elected for four years. By the act of 1867, the board of education consists of the governor, superintendent of public instruction, the principal of the state normal school, the superintendents of public schools in the counties of San Francisco, Sacramento, Santa Clara, Alameda, Sonoma, and San Joaquin, and two professional teachers to be nominated by the superintendent of public instruction and approved by the board. The schools are open to all white children between the ages of 5 and 21 years. Separate schools are provided for negro and Indian children. Ten per cent. of each annual apportionment of the school fund is set apart as a district school library fund. A state teachers' institute is held annually in San Francisco, and county institutes are held in many of the counties. The school fund is composed of the proceeds of all lands that may be granted by the United States for the support of schools, the congressional grant of 500,000 acres to all new states, all escheated estates, and all percentages on the sale of state lands. The interest on these sums, together with the rents of unsold lands, is devoted to educational purposes. The school revenue is augmented by half the proceeds of the poll tax and by a tax of 10 cents on every \$100 of taxable property throughout the state. There is also a county tax for school purposes, and a district tax may be levied for buildings. According to the census of 1870, the whole number of persons between 5 and 18 years of age was 187,129, of whom 91,176 were attending school. The number of schools of all classes was: public, 1,842, with 767 male and 1,116 female teachers, and 39,772 male and 35,775 female pupils; classical, professional, and technical, 41, with 204 male and 72 female teachers, and 3,225 male and 1,276 female pupils; and other private, parochial, and charity schools, 167, with 98 male and 205 female teachers, and 2,305 male and 3,324 female pupils. The total annual income for schools was \$2,946,308, including \$59,057 from endowment, \$1,669,464 from taxation and public funds, and \$1,217,787 from other sources, including tuition. The total expenditures for school purposes in 1871 amounted to \$1,718,430, of which \$1,103,125 was for teachers' wages. The total valuation of school property was \$3,362,580. There were 449 colored children and 140 Indians attending public schools, and 58 colored children and 14 In-

dians attending private schools. Little has been done by the public authorities for the instruction of the Chinese; but there are mission schools in which adults as well as children are taught in San Francisco, Stockton, Sacramento, and Marysville. Provision is made for the enumeration and instruction of Indian children who are under the guardianship of whites. The state normal school for the education and training of teachers was established in San Francisco in 1862, and in 1871 removed to San José. At the close of that year there were 5 instructors and 168 students, of whom 140 were females. The whole number of graduates is 258. The course of instruction is two years. The university of California was formally opened at Oakland Sept. 23, 1869. Its permanent site will be at Berkeley, 4 m. N. of Oakland, where a tract of 160 acres of land has been transferred to it by the college of California, which has been merged in the university. The university is under the control of a board of 22 regents, of which the governor, lieutenant governor, state superintendent of public instruction, speaker of the assembly, president of the state agricultural society, and president of the mechanics' institute of San Francisco are *ex officio* members. Colleges of agriculture, of mechanic arts, of mines, of civil engineering, of letters, and of medicine have been organized. A bureau of military instruction has been established, and there is a preparatory department connected with the university. In each of the colleges the full course is four years, with three terms in each year. Young women are admitted on the same terms with young men. Tuition is free in the university proper, but not in the preparatory department. At the beginning of the third scholastic year, September, 1871, there were 147 students, as follows: in the college of arts, 75; letters, 28; optional courses, 20; special courses, 24. During the year 26 young women were admitted to the university and 258 students to the preparatory department. The medical department had 8 professors, and the colleges of arts and letters 10. The university already possesses excellent apparatus valued at over \$30,000, and a library of about 3,000 volumes. Five scholarships of the annual value of \$300 have been established by the legislature. The expenditures from Dec. 12, 1869, to Jan. 1, 1872, amounted to \$270,304. The university is entitled to the 150,000 acres of land given by congress to the state for an agricultural college. There are 18 separate incorporated colleges in the state, of which the most important are the college of St. Augustine (Episcopal), at Benicia, having in 1871 7 instructors, 90 students, and a library of 11,000 volumes; St. Ignatius college (Roman Catholic), in San Francisco, with 19 instructors and 559 students; Santa Clara college (Catholic), at Santa Clara, with 17 instructors, 225 students, and a library of 12,000 volumes; the university of the Pacific (Methodist), at Santa Clara, with 6

instructors, 55 male and 60 female students, and a library of 2,000 volumes; the Pacific Methodist college, at Vacaville, with 7 instructors and 119 male and 88 female students; Hesperian college (Christian), at Woodland, with 7 instructors and 37 male and 82 female students; and the Franciscan college (Catholic), at Santa Barbara, with 6 instructors, 92 students, and a library of 2,000 volumes. So far as heard from, these 18 institutions had in 1871 90 instructors, 1,682 students, of whom 308 were females, and 19,150 volumes in their libraries. There are three theological seminaries: that of the college of St. Augustine (Episcopal), and the theological seminary (Presbyterian), in San Francisco, and the Pacific theological seminary (Congregational), at Oakland. In 1871 they had 8 instructors, endowments aggregating \$50,000, and 1,500 volumes in their libraries. The Toland medical college, in San Francisco, was organized in 1864, and in 1871 had 14 professors. There are three institutions for the superior instruction of females only: the young ladies' seminary at Benicia, the female college of the Pacific at Oakland, and the college of Notre Dame at San José. These institutions in 1871 had 46 instructors, 720 students, and libraries containing 5,000 volumes. There are two commercial and business colleges in San Francisco, and one at San José.—The total number of libraries reported by the census of 1870 was 1,617, with 474,299 volumes. Of these, 873, containing 316,674 volumes, were private, and 744, with 159,625 volumes, other than private; among the latter were 288 school and college libraries, with 29,113 volumes; 268 Sunday school, 63,940; 96 church, 18,180; and 31 circulating, 22,475. The principal libraries are those of the mercantile association of San Francisco, 30,000 volumes; of the odd fellows' association, 17,000; of the mechanics' institute, 12,000; of the What Cheer house, 5,000; of the Verein association, 4,500; the state library in Sacramento, 26,000; and the collection of the Sacramento library association. The total number of newspapers and periodicals in 1870 was 201, having an aggregate circulation of 491,903, and issuing 47,472,756 copies annually. Of these, 38 were daily, with a circulation of 94,100; 4 tri-weekly, circulation 9,500; 4 semi-weekly, circulation 2,700; 140 weekly, circulation 298,603; 1 semi-monthly, circulation 800; 17 monthly, circulation 82,200; 2 quarterly, circulation 4,500; and 14 were published in foreign languages: French 2, German 5, Spanish 4, Italian 2, and Russian 1.—The total number of religious organizations was 643, having 532 edifices, with 195,558 sittings, and property valued at \$7,404,235. Included in these were 7 Chinese organizations having 5 edifices, with sittings for 2,600 persons, and property valued at \$22,500; and 2 Greek organizations, with property valued at \$6,000. The principal denominations were:

DENOMINATIONS.	Organizations.	Sittings.	Property.
Baptist.....	60	16,775	\$271,800
Christian.....	39	8,850	84,100
Congregational.....	40	11,509	92,400
Episcopal.....	45	12,036	39,200
Jewish.....	7	8,610	314,000
Methodist.....	184	43,085	677,225
Presbyterian.....	79	21,798	426,000
Roman Catholic.....	160	66,640	1,671,200

The Chinese are nearly all Buddhists. A few of the Indians have been Christianized, but most of them are destitute of any creed beyond a vague belief in the Great Spirit.—The name California is first found in the writings of Bernal Diaz del Castillo, an officer who served under Cortes in the conquest of Mexico, and by him limited to a single bay on the coast. In some of the early English maps California is called New Albion, having been so named by Sir Francis Drake, who touched on the coast in 1578, during one of his buccaneering expeditions. A century later, being then supposed to be insular, it was called Islas Carolinas, in honor of Charles II. of Spain; but subsequently the original name was revived and universally adopted. Lower or Old California was discovered as early as 1534 by Ximenes, a Spanish explorer; but the first settlements were made much later, in 1683, by the Jesuit missionaries. The precise date of the discovery of New or Upper California is uncertain; but it was subsequent to that of Old California, and the first mission (San Diego) was founded as late as 1768. Other missions and presidios were established in the following years, and the government of the country, both spiritual and temporal, was intrusted to certain monks of the order of St. Francis. The bay of San Francisco was discovered about 1770, and a mission was established there in 1776. In 1803, according to Humboldt, 18 missions had been established, with 15,562 converts. Three more missions were subsequently established, and in 1831 the entire population is stated by Forbes in his "History of Upper California" at 23,025 (exclusive of unconverted Indians, of whom 18,683 were Indian converts. The Spanish power in California was overthrown by the Mexican revolution in 1822, and though the government of that country changed frequently, all administrations agreed in the policy of secularizing the government of California, and the fathers were finally stripped of their possessions and their former dignity and influence. The settlement of the country began to advance, particularly from the immigration of foreigners, the people of the United States being largely represented. During the years 1843, '44, '45, and '46 many thousands of emigrants from the United States settled in California. After the declaration of war between Mexico and the United States the struggle for the mastery in California terminated favorably to the latter early in January, 1847. The treaty of peace soon followed, by which California and certain other territory were

ceded to the United States for the sum of \$15,000,000. At the close of hostilities the white population was estimated at 12,000 to 15,000. In the month of February, 1848, gold was discovered on the property of Col. Sutter, near the town of Coloma in El Dorado co. The news spread rapidly, and it was soon found that gold was widely distributed throughout the state. People flocked in from Mexico, from South America, from the Atlantic states, from Europe, and from China. The emigration was altogether unparalleled. In a very short time California contained a mixed population of nearly a quarter of a million of energetic, daring, reckless, and dangerous people. A substantial government became necessary. Gen. Riley, the military governor of the territory, called a convention of delegates, to meet at Monterey, Sept. 1, 1849, to frame a state constitution. The convention met, and after about six weeks' consideration agreed on a constitution, which was submitted to the people, by whom it was adopted; and on Sept. 9, 1850, California was admitted into the Union. Gambling became almost a universal passion among the Californians. Whole squares were devoted exclusively to it in San Francisco. Real estate and prices of all kinds rose enormously, and rapid fortunes were made by speculators in houses and lots. Among the emigrants to California were a large number of outlaws from all parts of the world, but mainly from Australia and the United States. In the earlier history of gold digging there were no efficient means for a proper administration of justice. Lynch law was resorted to in many parts of the country, and finally vigilance committees were established in the chief towns, by whom thieves and murderers were arrested, summarily tried, and if convicted, hanged. The first vigilance committee in San Francisco was formed in 1851. That of 1856 had its constitution and an executive committee, to whose supervision the general management was intrusted, and which performed its functions with the utmost quietness and dignity. One of the provisions of the constitution was, that no person brought before the committee should be punished without a fair trial and conviction. The committee provided itself with arms and ammunition, drilled its forces, fortified its headquarters, and constructed cells for prisoners and apartments for its various necessities. It arrested and tried rogues and dangerous men, some of whom were hanged, some transported, and others acquitted. The committee successfully resisted the efforts of the state authorities for its suppression, and practically held supreme power. After a short reign the committee surrendered its power in the latter part of 1856, having during its extraordinary administration of public affairs tried and disposed of some 80 cases brought before them; four of their prisoners were executed, one committed suicide while his case was under deliberation, and most of the others were banished from the state.

In its earlier history San Francisco was six times nearly destroyed by fire. Sacramento and other large towns have also suffered in the same way. The total loss by fire in San Francisco alone has been estimated at \$20,000,000. During the autumn and early winter of 1861 California was visited by a disastrous flood which destroyed property estimated at \$10,000,000. One of the most violent and destructive earthquakes known in California occurred in the latter part of March, 1872, in Tulare and Inyo counties. The first and most violent shock was felt early on the morning of the 26th, and was followed by numerous minor shocks extending over several days. Large fissures in the ground and upheavals of earth extended for miles, causing great destruction of life and property. About 80 persons were killed and 100 wounded. The line of the shock extended from Red Bluff in Tehama co. as far S. as Visalia in Tulare co., where was the centre of the greatest violence. It followed the trend of the Sierra Nevada, reaching an elevation of from 8,000 to 4,000 ft. The area in commotion was about 500 m. long by 100 broad, but the shock was felt in San Francisco and other parts of the state. During the civil war no troops were furnished by California; this was due to the isolated position of the state, there being at that time no railroad communication with the east.—See "The Resources of California," by J. S. Hittel (San Francisco, 1868); "Geological Survey of California," by J. D. Whitney (vol. i., 1865); "History of California," by Franklin Tuthill (1866); *Californien: über dessen Bevölkerung und gesellschaftliche Zustände*, by K. Rühl (New York, 1867); "The Natural Wealth of California," by Titus Fey Cronise (San Francisco, 1868); "Progress of the Geological Survey, 1870-'71," by J. D. Whitney; "California: A Book for Travellers and Settlers," by Charles Nordhoff (New York, 1873).

CALIFORNIA, Gulf of (Span. *Mar Bermejo*, Red sea), a gulf of the Pacific, separating the peninsula of Lower California, on the west, from the Mexican states of Sonora and Chihuahua, on the east. It is about 700 m. long, and from 70 to 150 m. wide. Its coasts are indented with many small bays, and numerous islands stud its surface. The Colorado river discharges its waters into the upper extremity of the gulf, and several streams empty into it from the east. The ports of Loreto, La Paz, and Guaymas are situated on its shores. The N. portion is full of shoals, hidden rocks, and dangerous currents; the S. portion is safer for navigation. The California coast abounds in pearl oysters, and the fishery, now little pursued, was formerly very important.

CALIFORNIA, Indians of. The Indians of Lower California, at the time of the discovery of the peninsula, comprised two families, the Waikur on the south and the Cochimi on the north. Those of Upper California were of several families. In the north were the Makaw,

the Olamentke on Bodega bay, the Mutsun, and Acagchemem near Monterey; there were Shoshonee tribes further south, and then Yuma tribes. All these were on the lowest scale of humanity, went naked, used rude weapons, lived in mere huts of boughs or reeds, and were disgusting in food and manners. Nowhere was there more unpromising material for missionaries, yet in no part were missions established on a grander scale. The Jesuits began their reductions in 1697. A revolt took place in 1784, in which nearly all the missions were suspended, but they were soon restored. They trained the Indians to agriculture and the mechanical arts, and though the sloth of the Indians required a somewhat strict discipline, they made these communities self-sustaining. At the suppression of the Jesuits there were 16 of these missions. They then passed to the Dominicans and Franciscans, and in 1786 could still number 4,000 Christian Indians; but they have since greatly declined. The Franciscans began missions in Upper California in 1768, and conducted them with success, collecting the Indians, training and governing them. In 1884 these missions contained 80,000 Indians. The northern Indians were superior to those of the lower province, making good bows and arrows, nets, and rafts of bulrushes. They burned their dead. Their religious ideas were very vague, the medicine men being as usual the priests. Vapor and hot sand baths were their usual remedies. Under the Mexican government these missions were so broken up that in 1842 the population had dwindled to 4,450, their cattle were nearly gone, and their cultivated lands waste. The Mexican law recognized them as proprietors of these mission lands, but under the United States government this right has been ignored, and the surviving mission Indians in the counties of San Diego and San Bernardino, numbering 5,000, are homeless. They are to a certain extent civilized, and are hired by the whites. A proposal to place them on a reservation has led to difficulties fanned by interested whites. Besides the remnant of mission Indians, there were in 1871 800 Hoopas and Siahs, at the Hoopa Valley agency on Trinity river; 2,865 Klamath Indians, on the river of that name; 796 Ukies, Pitt Rivers, Wylackies, Concoows, and Redwoods, on Round Valley reservation; 176 Tulés and 198 Tejons on the Tulé reservation; 500 Wichumnies, Coweas, and Yokas, in the same county; and about 15,000 of other tribes scattered in various parts.

CALIFORNIA, Lower or Old (Span. *Baja* or *Vieja California*), a territory of Mexico, occupying the peninsula extending N. W. from Cape San Lucas, lat. $22^{\circ} 52' N.$, lon. $109^{\circ} 53' W.$, about 750 m. to lat. $32^{\circ} 20' N.$, and having a breadth of from 80 to 150 m.; bounded N. by California, E. by the Colorado river, which separates it from Arizona and Sonora, and by the gulf of California, S. and W. by the Pacific; area, about 57,500 sq. m.; pop. in 1868, 21,645.

The population consists chiefly of Indians and mixed races, mostly residing in the southern portion of the peninsula. It is divided into eight municipalities (*municipalidades*), each having an *alcalde*, or *jefe del distrito*, as its judicial head. The principal towns are La Paz, the capital, at the head of a bay on the S. part of the gulf coast, and Loreto, about 150 m. further N., both very small. The coasts are flat, sandy, irregular, and frequently indented by coves and bays, while, especially along the gulf, they are skirted by many small islands. The principal islands on the Pacific coast are Cedros and Santa Margarita; Guadalupe, about 120 m. N. W. of Cedros, also belongs to the territory. On the gulf coast are the islands of Cerralbo, Espiritu Santo, San José, Carmen, and Angelo de la Guarda. The principal bays on the Pacific coast, commencing at the north, are those of Todos Santos, San Quintín, Sebastián Viscaíno, Ballenas, and La Magdalena, which for the last 50 years has been visited by American whalers, sealers, and fur hunters, who since 1854 have had regular establishments there. Entering the gulf the first important bay is that of La Paz, which penetrates the land S. from Espiritu Santo island some 25 m., with a breadth of from 6 to 10 m. The cove opposite the town of La Paz may be reached by vessels drawing not over 18 or 20 ft. of water; this port is a stopping point for steamers from San Francisco to the ports along the Mexican coast. Loreto is next to La Paz, the best harbor on this coast. Other ports are Los Angeles, and, near the head of the gulf, San Felipe Jesus.—The peninsula is of volcanic origin, and is traversed throughout by mountains, which may be considered a continuation of the Sierra Nevada and Coast ranges. It is divided into three regions. From Cape San Lucas due N. to Cape La Paz, in lat. $24^{\circ} 20'$, about 100 m., stretches the chain known as Sierra de San Lazaro, having an average height of about 6,000 ft., and forming the backbone of the lower portion of the peninsula. Separated from this chain by La Paz bay, and commencing about the 24^{th} parallel, is the Sierra de la Gigantea, a chain having an average elevation of from 3,000 to 4,000 ft., but with occasional peaks 6,000 to 8,000 ft. high. It extends N. W. to about lat. $30^{\circ} 35'$, a distance of 500 m., and adheres closely to the gulf shore, from which it rises almost perpendicularly, while on the west it declines gradually in gentle slopes or plateaus, with occasional broken tracts, toward the Pacific. About lat. 29° the Coast range commences, and from lat. $30^{\circ} 40'$ the E. side of the peninsula, for a breadth of nearly 50 m. from this range to the head of the gulf and the Colorado river, is low and nearly level. Between lat. $26^{\circ} 40'$ and $27^{\circ} 50'$ the peninsula suddenly extends W., having an average breadth of about 135 m., and a range of coast hills of considerable altitude stretches N. W. and S. E. near the Pacific. In this region the land along the shore is low, and there are extensive la-

goons. The mountains are in general barren and desolate near their summits; but at their base are cactuses of extraordinary size, and such of the valleys as have a sufficiency of water are very fertile. Only a few small streams fall into the sea, but there are several springs in the interior, sending forth streams which lose themselves in the sand. Along the coast lagoons there is much good soil, and in the plains and most of the dry river beds water is found a few feet below the surface. Where irrigation has been practised, the crops are abundant. Extending through nearly 10° of latitude, Lower California has a great variety of climate. For about 80 m. N. of Cape San Lucas the air is mild, being tempered by the sea breeze; from this section N. to Loreto, lat. 26° 16', the heat is excessive; but further N. the air is cooler. The summer temperature on the Pacific coast ranges from 58° to 71°; that of the gulf coast is hotter. The sky is remarkable for its transparency and deep azure color, save at sunset, when it is often variegated by the most beautiful shades of violet, purple, and green. In winter there are heavy rains and terrific tornadoes. In summer and autumn, especially on the gulf coast, rain often falls from a cloudless sky. The vegetable productions of Lower California are maize, wheat, beans, peas, manioc, grapes, oranges, lemons, citrons, prunes, dates, plantains, pineapples, olives, and figs. The sugar cane has also been cultivated, and some cotton was raised by the Jesuits. Several varieties of the agave family are abundant, and many kinds of acacia trees, such as mesquites, algarrobas, and locusts, are common. Two varieties of native palms, bearing edible fruit, are frequently found. The pine, cedar, oak, wild plum, cottonwood, sycamore, willow, and elder are also met with. The principal animals are wild sheep, goats, horses, horned cattle, mules, and swine. The adjacent seas abound with excellent fish. The pearl oyster is found at intervals along the coast. It is most abundant in the bay of La Paz, near Loreto, and in the bays of Mulejé and Los Angeles. Fossil remains are found in various parts. Argentiferous galenas are very common above Mulejé bay, and pure sulphur occurs in the same region. Copper ores are found in several places between the N. boundary and the old mission of Rosario, about lat. 31°, on the Pacific coast, and also on the N. gulf coast; the deposits on Cerralbo, San José, and Espiritu Santo island are very rich. Quick-silver is also said to have been found near Santa Catalina mission, at the head of the gulf. The salt beds of the Pacific coast, from San Quintin to Magdalena bay, are numerous, and the salt is readily obtained. The mines on Carmen island are very rich, and large quantities of salt have been exported to San Francisco. The Mexican government has of late derived considerable revenue from these mines. Gold and lead are found, a mine of the former existing near La Paz.—Lower California was dis-

covered by Cortes in 1586. About 1690 the Jesuits formed establishments here, and instructed the natives in agriculture and civilization. They practised irrigation extensively, and exported some agricultural products to the mainland of Mexico. The Jesuits were expelled in 1767, and the missions were placed under the charge of the Dominican monks of the city of Mexico, under whom they greatly declined; and in 1838 they were all secularized by act of congress. In 1866 the Mexican government granted that portion of the peninsula lying between lat. 31° and 24° 20' to the "Lower California company" of New York, with considerable privileges. Their attempts at colonization, however, have not been successful.

CALIGNY, Jean Antenor Hue de, a French military and civil engineer, born in 1657, died in 1781. He was present at the sieges of Valenciennes, Freiburg, Courtrai, Furnes, and Dixmude, and superintended the construction of the Burgundy canal. He strengthened Calais against the English in 1694 and 1696 by new forts; and in 1706, after the battle of Ramillies, he frustrated the plans of Marlborough, by causing the two banks of the canals of Lefinghe and of Bruges to be inundated. He also constructed the great dam on the Aa, at Gravelines.

CALIGULA, Caius Cæsar Augustus Germanicus, the third emperor of Rome, born at Antium, Aug. 31, A. D. 12, put to death in Rome, Jan. 24, 41. He was the youngest son of Germanicus, the nephew of Tiberius. His proper name was Caius Cæsar, Caligula being an epithet applied to him from the *caliga* or half-boot of the Roman soldiers, which he usually wore in his youth. By his contemporaries he was always called Caius, and he regarded the name of Caligula as an insult. His earliest years were passed in camp with his father, and he became popular with the soldiers. After the murder of his father and the exile of his mother, Agrippina, he was brought up by his great-grandmother Livia, and afterward lived in the house of his grandmother Antonia. Tiberius promoted him to various posts of honor, and encouraged him to look forward to the succession to the imperial crown. Tiberius was killed in 87, as is generally believed, at the instigation of Caligula, who at all events afterward boasted that he had attempted to put him to death to avenge the wrongs which his family had suffered. Tiberius in his will named his grandson Tiberius Gemellus as co-heir with Caligula, but the senate and people gave the sovereign power to Caligula alone. The first seven months of his reign seemed a period of general prosperity. He then fell sick, and Rome was in mourning; many persons vowed to sacrifice their lives to redeem that of the emperor. When he recovered, his whole character appeared to have suffered a change. There can be no doubt that he had a constitutional taint of insanity, which was now more fully developed. He slept scarcely

three hours out of the 24, often paced the halls of the palace all night calling for the coming of day, and talked of secluding himself from the world or of taking poison. His excesses took the most violent and unnatural forms. He caused Tiberius Gemellus to be put to death on a frivolous pretext; and those of his friends who had vowed to give their lives for him were forced to kill themselves in order to carry out their vows to the gods. His thirst for blood increased with the number of his victims. He put the worn-out gladiators to death, because their maintenance was a burden to the state. And when there were no criminals to be thrown to the wild beasts in the arena, he ordered victims to be taken at random from the spectators, and had their tongues cut out that they might not make a disturbance by their outcries. When taking his meals he would sometimes order men to be put to torture before his eyes. He removed the awnings from the amphitheatre, that he might enjoy the spectacle of the crowds sitting in the hot summer sun. He found a pretext in the celebration for the battle of Actium to convict the consuls of treason, for on one side he belonged to the family of Augustus, the victor, and on the other to that of Antony, the vanquished. He built a bridge of boats three miles long between Baïæ and Puteoli, and when it was opened he caused numbers of those whom he had invited as spectators to be thrown into the sea. His cruelty was equalled by his voluptuousness, obscenity, and impiety. He committed incest with his three sisters, Julia, Agrippina, and Drusilla. The first two he banished as guilty of adultery; he deified the last after her death, punishing both those who mourned and those who rejoiced for her, since it was equally impious to mourn for the dead woman who had become a goddess, or to rejoice for the goddess when the woman was dead. He would sometimes appear in public as a god, arrayed as Jupiter, Bacchus, or Apollo, or even as Venus or Diana. He built a temple to himself as Jupiter Latarius, in which was a golden statue of himself, of life size and in his usual attire. The wealthiest citizens were compelled to purchase the honor of officiating as priests. Sometimes he acted as his own priest, and made his horse, whom he raised to the consulship, his colleague. In a short time he exhausted the immense treasures left by Tiberius, and resorted to every means for raising money. He established a public brothel in his own palace, and when his daughter was born publicly begged money for her by way of gifts. Having exhausted Rome and Italy by his extortions, he turned his eyes elsewhere. In the year 40 he marched to Gaul, under pretext of a war against the Germans, but really to extort money from the wealthy inhabitants. Executions became as frequent in Gaul as they had been in Italy. After this predatory campaign he led his army to the seashore, as if he would cross

over to Britain, but having put to sea returned without landing. The troops were drawn up in battle array on the seashore, and at a given signal were ordered to fill their helmets with shells, which he called the spoils of the subjugated ocean. Returning to Rome, he acted with even greater cruelty than before. Having no German captives to exhibit at his triumph, he had a large number of Gauls dressed up to simulate Germans, and caused them to be scourged and beheaded, as though they were enemies taken prisoners in battle. His rage was unbounded because the honors which the senate had decreed to him were unworthy of a god, which he claimed to be; and he was on the point of ordering the slaughter of half the senate and more than half the equestrian order, when his career was cut short, four months after his return to Rome, and in the fourth year of his reign. Cassius Cherea, a tribune of a prætorian cohort, and others conspired to put him to death. According to some he was killed near the theatre, according to others in his own palace, while he was hearing some boys rehearse the parts which they were to perform in the theatre. His favorite wife, Milona Cæsonia, whom he had threatened with torture in order to force her to divulge how she had made him love her, remained by the corpse, and when the murderers returned bade them kill her, so that she might die with her husband. She was put to death, along with her infant daughter. The corpse of Caligula was taken at night by his friends, half burned, and hastily buried. His sisters, whom he had banished, came back and had the remains disinterred, completely burned, and the ashes honorably disposed of.

CALIPH (Arab. *khalif* or *khalifa*, successor, the title of the spiritual and temporal successors of Mohammed. The prophet seems to have made no provision for the future administration of the affairs of state, and died without naming his successor. Immediately after his death (632) three rival parties appeared. At the head of the first was Omar, who demanded the election of Abu Bekr, Mohammed's father-in-law, foreseeing that he himself would succeed. The second party was headed by Ali, son-in-law and general of the prophet, who declared for himself. The third party consisted of the Medinites, who demanded the election of one of themselves. Abu Bekr, then a very old man, was chosen. Under him the scattered portions of the Koran were collected into one volume. Before his death he appointed several electors who he knew would declare for Omar. On Omar's assassination, Othman succeeded to the caliphate. Under his weak rule dissensions and factions were instigated by Ali and his friend, who declared that the prophet would return to earth, and that Ali, having been his vizier, had been left as his regent. Ali's supporters are known as Shi'ahs or Shiites. Othman was finally murdered, and Ali was chosen caliph. After suppressing the re-

bellion caused by Talha and Zobair, Ali found himself confronted by Moawiyah, governor of Syria, one of Othman's relations, and a division of the Moslems was the consequence. Ali was assassinated, and was succeeded by Hassan, his son, who resigned in favor of Moawiyah, and soon after died, as supposed by poison administered by his wife, at the instance of Moawiyah. Moawiyah founded the dynasty of the Ommyyades (from Ommiyah, his ancestor), the caliphs of Damascus (661). He obtained the allegiance of the countries conquered by Omar, and the acquiescence of Mecca and Medina to the nomination of his son Yezid as his successor. He also made the caliphate hereditary in his own family. Hossein, brother of Hassan, was invited to assume the caliphate by the Moslems of Irak. While proceeding thither he was intercepted by a detachment sent by the governor of Cufah and killed, together with all his attendants. The hereditary line of the Ommyyades was broken by Merwan I., who transferred the caliphate to his own son, instead of the brother of Moawiyah II., to whom he had been appointed guardian. The reign of Abdel-Malek was signalized by the establishment of a regular coinage throughout the empire, and Walid I. discontinued the Greek language and characters in keeping the accounts of the revenue, and substituted the Arabic figures. Meantime the Shiabs or partisans of Ali became numerous, especially in the countries bordering on Hindostan, where belief in the transmigration of souls was prevalent. They maintained that Ali, like Mohammed, would return to earth, and until then the right of succession was vested in the imams, his descendants. With these and other like doctrines, and by representing the Ommyyades as tyrants and usurpers, the Shiah empire gradually undermined the power of the Ommyyades. The descendants of Abbas, one of the uncles of Mohammed, joined the Shiabs for the overthrow of the Ommyyades. On the accession of Merwan II. to the throne the empire became distracted with insurrections. Cufah deposed its Syrian governor, and proclaimed a caliph of its own. At Bassorah another rival was elevated, but was routed with great loss near Damascus. At length a descendant of Abbas marched into Syria and routed the army of Merwan, who fled to Egypt, where he was slain. Thus ended the dynasty of the eastern Ommyyades in 750, after a reign of 89 years. The Aliides were again dispossessed, and the Abbassides founded the dynasty of that name, whose caliphs transferred their seat to Bagdad. The accession of the Abbassides was characterized by so much cruelty and bloodshed as to gain for the first of them the appellation of Ee-Saffah, the bloody. A younger son of Merwan II., Abderrahman, escaped to Spain, where he founded the dynasty of the Spanish Ommyyades. Though the Shiah missionaries preached the divine inspiration of the descendants of Ali, yet nei-

ther the latter nor the Abbassides brought forward any other claims to the caliphate than the right of descent, the former from Fatima, the prophet's daughter, and from Ali, and the latter from Abbas, the uncle of the prophet and the last survivor of his companions, rejecting the claims of the Aliides in consequence of their descent from a woman, who had no right of succession. The Aliides in spite of their defeats were not discouraged, and with the aid of the Berbers they succeeded in establishing a caliphate in N. W. Africa. They afterward transferred their seat to Egypt (909). One of them, Hakem, assumed the title Biamri, "in my own right," instead of Billah, "by divine right," and declared himself an incarnation of the Deity. Under the auspices of the Fatimites, and for the purpose of undermining the power of the Abbassides, the famous lodge at Cairo was instituted from which emanated the sect of the Assassins. (See ASSASSINS.) In 1171 the last of the Fatimite dynasty died. Abderrahman, the younger son of Merwan II., the Ommyyade, who had escaped to Spain, succeeded in raising himself to the caliphate in that country, and his dynasty lasted for three centuries. In wealth and display they fully equalled the Abbassides. They finally grew feeble and tyrannical, and their last caliph, Hahsem III., was in 1031 deposed by the army, and with him terminated the dynasty of the Spanish Ommyyades. The Abbassides, enfeebled by long subjection to a foreign body guard, originally composed of African, Circassian, and other slaves, who had made themselves absolute masters of the caliphate, were overthrown by Hulaku on the capture of Bagdad in 1258, and Mustasem, the last of the dynasty, was put to death. In 1264 Sultan Bibars, to give his claim to the throne some show of legitimacy, appointed one of the Abbassides as caliph, but with spiritual authority only. The latter in return invested him with temporal dominion over all Moslem countries. But afterward, fearing that he might ascribe to himself temporal power as well, Bibars withdrew a part of his guard from the caliph, who succumbed before the Tartar governor of Bagdad and fled to Egypt; Bibars appointed another in his place, whom he however treated as a prisoner. (See ABBASSIDES.)—Although the caliph was the supreme temporal and spiritual head, he could not decree any new dogmas, and where the Koran did not reach the question at issue, it was to be decided from precedent, analogy, and tradition, and to be determined by the judges and ulemas rather than by the caliphs. The first successors of Mohammed are called the perfect caliphs. By the Sunnite Mohammedans the Turkish sultan is in some measure regarded as a successor of the caliphs, especially as possessing dominion over the four holy cities, Mecca, Medina, Jerusalem, and Damascus.—The following table gives the members of the different lines of caliphs, with the dates of their accession:

PERFECT CALIPHS (of Arabia).		Muktadi.....	1075
Abu Bekr.....	682	Mustader.....	1094
Omar I.....	684	Mustarshid.....	1118
Othman.....	644	Rashid.....	1184
Ali.....	655	Muktad II.....	1186
Hassan.....	661	Mustajid.....	1160
OMMIYADES (of Damascus).		Mustadhi.....	1170
Moawiyah I.....	661	Nasir.....	1190
Yezid I.....	680	Daher.....	1225
Moawiyah II.....	688	Mustanser.....	1226
Merwan I.....	684	Mustasem.....	1248-1256
Abdelmalek.....	685	FATIMITES (of Africa).	
Walid I.....	705	Abu Obeldallah.....	909
Solyman.....	715	Kaim Abul Kasim.....	936
Omar II.....	717	Almansour.....	946
Yezid II.....	720	Moez.....	958
Hashem.....	734	Aziz.....	975
Walid II.....	743	Hakem.....	990
Yezid III.....	744	Daher.....	1021
Ibrahim.....	744	Abu Tamin Mustanser.....	1086
Merwan II.....	744-750	Abul Kasim Mustal.....	1094
ABBASIDES (of Bagdad).		Abul Mansur Amer.....	1101
Abul Abbas (Ee-Saffah).....	750	Hafed.....	1180
Abu Jafar Almansour (the victorious).....	754	Dafar.....	1149
Mahdi.....	775	Fayez ben Nasrillah.....	1155
Hadi.....	785	Adhed.....	1160-1171
Haroun al-Rashid.....	786	OMMIYADES (of Cordova).	
Amin.....	809	Abderrahman I.....	756
Al-Mamoun.....	818	Hashem I.....	787
Mustasem.....	888	Al Hakem I.....	796
Vathek.....	842	Abderrahman II.....	823
Mutawackel.....	847	Mohammed I.....	852
Muntasir.....	861	Almondhir.....	886
Mustain.....	862	Abdallah.....	888
Mutaz.....	866	Abderrahman III.....	919
Muktadi.....	869	Al Hakem II.....	961
Mutaded.....	870	Hashem II.....	976
Muktad I.....	892	Mohammed al-Mahdi.....	1009
Muktader.....	902	Solyman.....	1009
Kaher.....	908	Mohammed (relected).....	1010
Rahdi.....	932	Hashem (relected).....	1012
Muttaki.....	940	Hamud.....	1016
Mustaki.....	944	Abderrahman IV.....	1017
Muthi.....	946	Kasim.....	1021
Tal.....	974	Yahya.....	1021
Kader.....	991	Abderrahman V.....	1023
Kaim.....	1081	Mohammed III.....	1024
		Yahya (relected).....	1025
		Hashem III.....	1025-1081

CALIPPUS, or **Callippus**, a Greek astronomer, born at Oyzicus in the early part of the 4th century B. C. He is said to have been a pupil of Plato, and associated with Aristotle in rectifying and completing the discoveries of Eudoxus. Already several attempts had been made to express in entire numbers the three great natural unities of time, the solar year, the lunar month, and the solar day. A century before, Meton had discovered that 19 years corresponded to 235 months, or 6,940 days. Calippus, it is said, by means of a lunar eclipse which occurred six years before the death of Alexander, was enabled to detect in this calculation an error of about a quarter of a day in the 19 years, which he proposed to avoid by quadrupling the cycle and reckoning it at 76 years less one day. This period of 76 years was called the Calippic cycle, and was adopted by astronomers after the year 380 B. C.

CALIXTINES. I. A branch of the Hussites, so called from their demanding the communion in both kinds, that is, including the cup (Lat. *calix*), for laymen; also called Utraquists (Lat. *utraque*, in both). (See **HUSSITES**.) II. The followers of George Calixtus, the founder of the party called Syncretists. (See **CALIXTUS**, **GEORGE**.)

CALIXTUS, the name of three popes. I. The first, born in slavery, was bishop of Rome from about 217 to 223, when he is said to have suffered martyrdom. II. **Guldo of Burgundy**, born near Besançon, died in Rome in 1124. He was the fifth son of William, count of Burgundy, and related to the queen of France, the emperor of Germany, and the king of England. In 1096 he was archbishop of Vienne, and he soon after went to the courts of France and England as papal legate, principally in order to settle the vexed question of lay investiture. In 1119 he was elected to succeed Pope Gelasius II. He held councils at Toulouse and Rheims, at the latter of which the emperor Henry V., while encamped in the vicinity with 80,000 men, was solemnly excommunicated by Calixtus, in presence of the council. After closing the council Calixtus went to Rome in 1120, where an antipope, named Gregory VIII., had established himself under the protection of the emperor; but Calixtus expelled him, and with the aid of the neighboring princes stormed the castle of Sutri, whither he had fled, and made him prisoner. He next attacked the Frangipani and Cenci, broke their power, and demolished their castles. In 1121 and 1122 he sent legates to Germany; a diet was held at Würzburg, and finally the *pactum Calixtinum*, or concordat of Worms, was concluded. Henry sent ambassadors to the pope, and in 1123 the first Lateran council was held, at which 300 bishops were present, and in this council Henry was absolved, and the question of investiture finally settled. In the remainder of his life Calixtus paid particular attention to the decoration of St. Peter's church, and repairing the aqueducts of Rome. III. **Alfonso Borgia**, a member of the Spanish branch of the Borgia family, born at Valencia about 1380, died Aug. 6, 1458. After having received an excellent education, he was promoted to a canonry by the antipope Benedict XIII. (Pedro de Luna) whose party was embraced by Alfonso V., king of Aragon. Having soon after been called to the royal council by Alfonso, he was sent by him to Benedict's successor, in order to induce him to abandon his pretensions; and having succeeded in this mission, he negotiated the reconciliation of his sovereign with Pope Martin V., and was rewarded by that pontiff with the archbishopric of Valencia. In 1444 he was made cardinal by Eugenius IV., as a reward for negotiating a reconciliation between himself and Alfonso V. On April 8, 1455, he succeeded Nicholas V. on the papal throne. The ruling idea of his pontificate was the revival of the crusades against the Turks, who had just captured Constantinople. He endeavored vainly to unite all Christendom in this undertaking. The greatest fault which he committed was the elevation of his two unworthy nephews, Rodrigo Lenzuolo (who assumed the name of Borgia) and Milo, to the dignity of cardinals, the former of whom became afterward pope under the name of Alexander VI.

CALIXTUS, George (properly **CALLISEN**), a Lutheran divine, born at Meelby in Holstein, Dec. 14, 1586, died in Helmstedt, March 19, 1656. From 1609 to 1613 he travelled through France, England, and Germany, and by this means became acquainted with many of the leading theologians of those countries. On his return the duke of Brunswick appointed him professor of theology in Helmstedt, where he remained for nearly half a century, writing and publishing a large number of theological works, and endeavoring to reconcile and unite the various Christian churches, on the basis of the Apostles' creed. At the conference of Thorn (1645) he showed himself so moderate in his Lutheran opinions as to favor and attempt the reconciliation of the Protestants and the Reformed church, and thereby incurred the hatred of Calovius and his adherents, who insisted on his excommunication from the Lutheran church as suspected of Calvinism. He had already been accused of Catholicism on account of one of his works, the *Epitome Theologiae Moralis*. On the other hand, the Catholics regarded him as their most sagacious and insidious enemy. He considered a union of the sundered body of Christ feasible, if the conflicting parties could be induced to return to the oecumenical councils and laws of the first five centuries. This plan gave rise to what is known in ecclesiastical history as Syncretism, though the followers of Calixtus are sometimes called Calixtines. He had embraced the Aristotelian philosophy, and on that plan he produced scientific systems of ethics and theology. A full list of his writings is given in his *Consultatio de Tolerantia Reformatorum* (Helmstedt, 1697).

CALLA, a genus of plants, belonging to the *arum* family, marked by an open and spreading spathe, with a white upper surface, an ob-

rope, and is common in cold bogs in the northern United States. Its seeds are surrounded with jelly. In Sweden its root is dried, and furnishes a kind of meal from which bread is made. The *C. Ethiopica* was introduced into England from the Cape of Good Hope in 1781. It is also found wild in St. Helena. Its large spathe is pure white, surrounding a spadix which is colored deeply yellow by its antheriferous flowers. It is often cultivated, and is one of the most beautiful of aroideous plants. Being hardy, it will live in temperate regions, growing in great vigor in the ordinary apartments of a house, and may be made to blossom all the year round.

CALLAHAN, a N. W. county of Texas, partly drained by Hubbard's creek, the Middle fork of Pecan bayou, and an affluent of the Cedar fork of Brazos river; area, 900 sq. m.; yet unsettled. The surface is somewhat broken and rocky, and chiefly adapted to grazing. Timber is scarce, and the climate dry and salubrious.

CALLAO, a fortified town of Peru, the principal seaport of the republic, on the river Rimac, in the department and 6 m. W. of Lima, of which city it is the port; lat. 12° 6' S., lon. 77° 14' W.; pop. in 1871 estimated at 27,000, of whom 17,000 were natives, 5,000 Italians, 300 Germans, 2,000 British subjects, 500 French, 700 North Americans, and 1,500 Chilians and Ecuadorians. The harbor is defended by three forts with an armament of 200 guns, and is sheltered toward the south by the barren island of San Lorenzo, 9 m. in circumference, and whose highest point is 600 feet above the level of the sea. The present town is three quarters of a mile from the original site. The houses were formerly for the most part low and of miserable appearance, having until lately been rarely constructed of other materials than mud, with flat roofs and only one story, owing to the frequency of earthquakes. There is, however, parallel to the bay, a handsome street with a number of good edifices and private dwellings of two stories. The roofs are often of hardened mud, as it never rains here, the only moisture proceeding from an occasional thick drizzling mist. Ship loads of wheat are at times seen piled up on the mole for weeks together without any shelter. The heat at Callao is very great, and natives and foreigners suffer from severe attacks of ague. Miasmatic affections are also very common, the miasma probably proceeding from the outskirts of the town, which are covered with a coarse grass, with here and there a few very small pools of stagnant water. The atmosphere is sometimes loaded with foul smells, especially that peculiar one which may be perceived in almost every town within the tropics. The old castle or fortress has been dismantled and converted into a custom house. The market is situated in a square occupying an acre and a half. The commerce at this port has been steadily growing in importance since its foundation. The chief exports are guano, nitrate of soda, borate



Calla Ethiopica.

long spadix entirely covered with flowers, heart-shaped leaves, red berries, and thick creeping root stocks. The *C. palustris* is a native of marshy places in the north of Eu-

of lime, opium, cochineal, and Peruvian bark. The total value of the exports during the year ending Sept. 30, 1871, was \$12,959,289 41; and that of the imports, \$15,669,655. In the same year the port movements were as follows: Entered, 7 steamers, of 6,932 tons, and 460 sailing vessels, of 870,806 tons; cleared, 7 steamers, of 6,942 tons, and 455 sailing vessels, of 866,601 tons. The town has railway and telegraph communication with Lima.—Callao was besieged for five months in 1624 by the British pirate Clark, who died there without having been able to take it. It was incorporated as a town in 1671. It was completely submerged with all its inhabitants during the memorable earthquake of 1746, and the ruins are still distinguishable under water when the sea is calm. In 1820 its harbor was the scene of a naval combat between the independents of Chili and the Spaniards, who were defeated, and in September of the following year surrendered Callao, their last foothold in Peru. In 1825 it was almost entirely submerged by a volcanic upheaval of the ocean, and again in August, 1868.

CALLAWAY. I. A S. W. county of Kentucky, bordering on Tennessee, on the W. bank of the Tennessee river, here navigable by steamboats; area, 450 sq. m.; pop. in 1870, 9,410, of whom 812 were colored. Level and hilly grounds divide the surface almost equally; the soil is fertile. The chief productions in 1870 were 33,770 bushels of wheat, 417,410 of Indian corn, 13,598 lbs. of wool, and 1,924,502 of tobacco. There were 2,192 horses, 1,503 mules and asses, 2,186 milch cows, 2,868 other cattle, 8,885 sheep, and 18,670 swine. Capital, Murray. II. An E. county of Missouri, bounded S. by the Missouri river; area, 743 sq. m.; pop. in 1870, 19,202, of whom 8,434 were colored. The surface is moderately uneven, and about one third of it is occupied by prairie land; the soil is uniformly fertile. Coal, iron, limestone, and potter's clay are found in various places, and in large quantities. The chief productions in 1870 were 167,545 bushels of wheat, 971,715 of Indian corn, 405,294 of oats, 45,229 of potatoes, 10,895 tons of hay, 205,288 lbs. of butter, 89,890 of wool, and 938,228 of tobacco. There were 8,767 horses, 2,958 mules and asses, 7,189 milch cows, 18,042 other cattle, 80,830 sheep, and 34,033 swine. Capital, Fulton.

CALLCOTT. I. Sir Augustus Wall, an English landscape painter, born at Kensington in 1779, died there, Nov. 25, 1844. He was elected a member of the royal academy in 1810, when he exhibited his picture of "Morning." His principal productions are "Returning from Market," "Waiting for the Passage Boat," "The Ferry," "Harvest in the Highlands," with figures by Landseer, and "Raphael and the Fornarina." He was knighted in 1837, and made conservator of the royal pictures in 1844. II. John Wall, an English composer, brother of the preceding, born at Kensington in 1766, died in

May, 1821. He assisted in 1787 in forming the glee club, and excelled particularly in that branch of national music. The degree of doctor of music was conferred on him in 1790. In 1805 he published a "Musical Grammar," and in 1806 was made lecturer on music at the royal institution, but soon resigned on account of ill health. His choicest compositions were brought out in 1824, after his death. III. Maria, an English authoress, wife of Sir Augustus Callcott, born in 1788, died in 1842. She was the daughter of Capt. Dundas, and was first married to Capt. Graham. She published on account of her travels in India, "Three Months in the Environs of Rome," "Memoirs of Porcain," "Essays toward the History of Painting" (1836), and other works.

CALLEJA, Felix del Rey, conde de Calderon, a Spanish general, born in 1750, died about 1830. He commanded the royal forces in Mexico during the insurrection under Hidalgo, whose army he defeated in several engagements, and on Jan. 2, 1812, took possession of the fortress of Zitacuaro and massacred the inhabitants. Hidalgo, who was betrayed and shot, July 27, 1811, was succeeded by the priest Morelos, who bravely defended Cuautla Amilpas against the attack of Calleja till May 2, 1812, when famine forced him to surrender. Calleja again signalized his victory by acts of barbarism, and was rewarded for his zeal, March 4, 1813, by the appointment of viceroy. Morelos fell into his hands and was shot, Dec. 22, 1815. Subsequently he promulgated an amnesty, but as he was unable to restore peace to the country, he was recalled, Sept. 20, 1816. On his return to Spain he was created conde de Calderon, and in January, 1820, while preparing to sail from Cadiz against the revolutionists of Paraguay, his troops mutinied, and he was for a time imprisoned by them in the fortress of the Isla de Leon.

CALLENDER, James Thompson, a political writer, born in Scotland, died in Richmond, Va. in July, 1803. He was exiled for publishing his "Political Progress of Britain," and came to Philadelphia, where he published the "Political Register" (1794-'5) and the "American Register" (1796). For a long time he was editor of the "Richmond Recorder," and distinguished himself by his attacks upon the administrations of Washington and Adams. He also published "The Prospect before us" and "Sketches of American History." He was at one time a friend of Jefferson, but became an enemy. He was drowned in the James river while bathing.

CALLICRATIDAS, a Spartan general, succeeded Lysander, B. C. 406, in the command of the Lacedæmonian fleet against the Athenians. His first operations against Conon at Methymna and Mytilene were successful, but an additional fleet of 150 vessels arriving from Athens while he had but 120 besides those engaged in the blockade of the latter city, he was defeated off the Arginusæ; and, thrown overboard in the action, he was drowned.

CALLIÈRES BONNEVUE, *Louis Hector*, chevalier de, governor of Canada, born in France in 1639, died in Quebec, May 26, 1708. He entered the army early in life, and in 1664 rose to a captaincy in the regiment of Navarre. He was governor of Montreal in 1684, and three years after led the van of Denonville's army which invaded the Seneca country in western New York. Seeing the impossibility of holding Canada without the possession of New York, he laid a plan for its reduction before his government, and went to France to urge it. His administration at Montreal showed such judgment, capacity, and bravery that he was appointed governor general of Canada in 1699. He maintained the ascendancy acquired by Frontenac, founded Detroit, secured the western tribes, checked the Iroquois, and supported the Abenakis. He was seized with a fatal illness while attending mass.

CALLIMACHUS. I. A Greek architect and statuary, supposed to have lived before 396 B. C., and said to have invented the Corinthian column. II. An Alexandrian grammarian and poet, born at Cyrene in Africa, died about 240 B. C. He was chief librarian of the Alexandrian library from 260 till his death. For some time he kept a school at Alexandria, and numbered among his pupils Eratosthenes, Aristophanes of Byzantium, and Apollonius Rhodius. Only six hymns and 74 epigrams remain of his numerous writings.

CALLINUS OF EPHEBUS, the earliest Greek elegiac poet, lived about 700 B. C. One of his elegies consisting of 21 lines is extant, having been preserved by Stobæus.

CALLIOPE, in Greek mythology, the muse of epic poetry, named from the sweetness of her voice (*καλός*, beautiful, and *ὄψ*, the voice). She



Calliope. (From the Museum of the Vatican.)

is represented in ancient art as bearing a tablet and stylus, waiting to record heroic deeds. She is particularly associated in the ancient statues with Homer.

CALLIERHOË, a fountain near Athens. In the time of the Pisistratidæ it received the

name Enneacrunus (the nine springs), because its waters were there distributed by nine pipes. It still bears its ancient name.

CALLISEN. I. *Henrik*, a Danish surgeon, born at Preetz, Holstein, May 11, 1740, died in Copenhagen, Feb. 5, 1824. He was a surgeon in the navy, and studied abroad at the expense of the Danish government. In 1794 he became general director and the principal professor of the surgical academy, after having declined in 1787 a professorship at the university of Berlin. He retired in 1805. A second and enlarged edition of his *Institutiones Chirurgiæ hodiernæ* (1777) appeared in 1798-1800, under the title of *Principia Systematis Chirurgiæ hodiernæ*, and more recent editions under that of *Systema Chirurgiæ hodiernæ*. It has been translated into German. II. *Adolph Carl Peder*, nephew of the preceding, born in Glückstadt, April 8, 1786. He acquired distinction as a surgical professor at Copenhagen (1816 to 1848), and as the author of a biographical dictionary of living physicians, surgeons, pharmacists, and naturalists (*Medicinisches Schriftstellerlexikon der jetzt lebenden Aerzte, Wundärzte, Geburtshelfer, Apotheker und Naturforscher aller gebildeten Völker*, 33 vols., Copenhagen, 1829-'45).

CALLISTEIA (Gr., from *καλλοειν*, prize of beauty), a festival among the ancient Greeks at which a prize was adjudged to the fairest. One of these contests was held by the women in the temple of Juno on the island of Lesbos; another formed a part of the festival celebrated by the Parrhasians in Arcadia, in honor of Ceres Eleusinia; and a third occurred among the Eleans. In the last, only men contended; the most beautiful man received a suit of armor which he dedicated to Minerva, and on his way to the temple was encompassed by his friends and adorned with ribbons and a myrtle wreath.

CALLISTHENES, a Greek philosopher, born at Olynthus. He was a relation and pupil of Aristotle, by whose recommendation he accompanied Alexander the Great to Asia. He often expressed disapprobation to Alexander, and at length, when the conqueror had adopted the pomp and the humiliating ceremonial of the Persian court, Callisthenes not only freely uttered his own indignation, but excited displeasure among the soldiers. He was put to death by command of Alexander. He wrote several histories, which are lost; but one of the most popular of the mediæval romances, filled with traditions and fancies concerning the oriental life of Alexander, has been attributed to him.

CALLISTO, an Arcadian nymph, a companion of Diana in the chase, beloved by Jupiter, to whom she bore a son, Arcas. To conceal the amour, Jupiter metamorphosed her into a she bear. Juno discovered the truth, and caused Diana to shoot the bear. Jupiter placed Callisto, under the name of Arctos (bear), among the stars.

CALLISTRATUS, an Athenian orator. He was a member of the oligarchical party in Athens,

and a supporter of Spartan interests in that city. In June, 371 B. C., he accompanied the ambassadors from Athens to the Laedæmonian congress then assembled at Sparta to negotiate a peace. He made an effective speech advocating the separate autonomy of the Grecian cities, and on that basis the treaty was concluded. In 366 he defended himself and his former colleague Chabrias, when prosecuted for advising the intrusting of the town of Oropus to the Thebans; and Demosthenes was so much impressed by his eloquence on this occasion that he resolved to devote himself to the study of oratory. Callistratus was acquitted, but he was not forgiven by the people, and in 361 was on some pretext condemned to death. He went into banishment in Macedonia, where he is said to have founded Datum, afterward Neapolis, the seaport of Philippi. Some years later he returned to Athens and was put to death.

CALLOT, Jacques, a French painter and engraver, born at Nancy about 1593, died there in March, 1635. His father, Jean Callot, who was herald at arms of the duchy of Lorraine, opposed the passion for art which he showed, even while learning to write, in designs for the letters of the alphabet, and in crayon drawings of soldiers, street beggars, singers, and mountebanks. In order to become an artist he ran away from home when but 12 years of age, and while journeying to Italy fell in with a band of gypsies at Lucerne, joined them, and improved his time by making sketches representing his companions in camp and on the march. He left them at Florence, where he stayed for a while, and studied under Remigio Cantagallina, becoming familiar with the old masters. He then proceeded toward Rome, but was hardly in sight of the city when he was recognized by some merchants from Nancy, who took him back by force to his home. He again escaped, but was taken and brought back by his older brother, who lay in wait for him at Turin. But his persistence was such that his family finally allowed him to accompany to Rome the ambassador of Lorraine who announced to the pope the accession of Duke Henry II. There he studied drawing under Giulio Parigi, and the use of the graver under Philippe Thomassin; but he soon abandoned the graver for the point. He went again to Florence, where he gained great popularity and was patronized by Cosmo II. After Cosmo's death he went to Nancy, where he married in 1625, then to Brussels, where he illustrated the siege and capture of Breda, and finally in 1628 to Paris, where he was engaged by Louis XIII. to illustrate the siege of La Rochelle and the attack and capture of the isle of Ré. He refused to celebrate in the same manner the capture of his native city by that monarch in 1633, and also declined a pension offered him by Louis, who, instead of being displeased at the artist's patriotism, accounted the duke of Lorraine fortunate in having such subjects. Callot worked with wonderful ease

and rapidity, showed great fertility of invention, and was peculiarly successful in the presentation of the grotesque and horrible. The number of his plates is over 1,600; among the more celebrated are the sieges above named, the two "Temptations of St. Anthony," the "Murder of the Innocents," "The Punishments," the great "Passion of Jesus Christ" in seven plates, the little "Passion," in twelve plates, martyrdoms, miracles, and fairs.

CALLUS, any unnatural hardness in the body, particularly of the skin, as on the hands or feet, from friction or pressure. When these excrescences are of such a size or so situated as to produce pain or inconvenience, relief is obtained by paring away the projecting non-vascular parts, and by protecting the skin from a continuance of the friction or pressure which caused the induration. The most common application of the word, however, is to the new growth of osseous matter around and between the extremities of fractured bones, serving to unite them. The mode of reparation is attended by the following changes: 1. Extravasation of blood where the bone is fractured. After this is absorbed, liquor sanguinis is effused, and assumes the position which the blood had occupied. 2. This consolidates, and the watery portion being absorbed, the rest becomes organized. 3. This period of plastic exudation lasts eight or ten days, and then becomes quasi-cartilaginous. 4. This mass contracts, increases in density, and gradually becomes very hard and strong. 5. The ossification or solidification advances from the periphery, and the fractured extremities are now surrounded by a bony case termed the provisional callus. 6. After this is formed, continuity is truly restored by the formation of what is called definitive callus or true bone, which takes place between the fractured extremities. 7. Finally, the provisional callus is absorbed and disappears. It was formed merely to serve as a natural case or splint to maintain the broken extremities in their position while the osseous reparation was proceeding to restore the natural unity and continuity of structure.

CALMAR, or *Kalmar*. I. A *län* or district of Sweden, province of Gothland, bounded N. W. and N. by Östergothland, E. by the Baltic and Calmar sound, S. by the *län* of Blekinge, and W. by Kronoberg and Jönköping; area, 4,480 sq. m.; pop. in 1871, 284,597. The coast is much indented and very rocky, especially in the north where there are numerous islands. The country is full of lakes, and, although nowhere very mountainous, in the north is hilly and rocky. The only river of importance is the Emån. There are large forests of beech and pine timber, and the fisheries of the coast are very productive. II. The capital of the district, situated on the Calmar sound, opposite the island of Öland, 190 m. S. S. W. of Stockholm; lat. 56° 40' N., lon. 16° 20' E.; pop. in 1869, 9,421. It is built partly on a small island and partly on the mainland, the two parts being connected

by a bridge of boats. The houses are nearly all of wood, though the cathedral, castle, and a few other public buildings, are of stone. The cathedral, a handsome edifice, stands in the great square. The castle, on the mainland, in which the treaty was signed in 1897 which united the kingdoms of Sweden, Denmark, and Norway under Margaret of Denmark, is now used as a house of correction. The harbor is good, and the commerce considerable. The exports are iron, alum, timber, pitch, tar, and stone from the island of Öland. Sugar, snuff, tobacco, petash, and woollen goods are the chief manufactures.

CALMET, Augustin, a French scholar and Benedictine of the congregation of St. Vannes, born Feb. 26, 1672, died in Paris, in October, 1757. He began to study theology in the priory of Breuil, but learned Hebrew under Faber, a Lutheran divine. In 1698 he was appointed to instruct the younger monks of Moven-Montier in theology; in 1704 he became director of the abbey of Münster in Alsace, where he expounded the Scriptures; and he passed thence to the abbey of St. Léopold, near Nancy, in 1718, and to that of Senones in 1728. He was actively engaged in his duties till his death, honored by all for his piety and simplicity, and held in regard even by Voltaire. He devoted himself laboriously to archaeological, historical, and theological studies, and left many learned works, among which are the *Dictionnaire historique et critique de la Bible* (4 vols. fol., Paris, 1722-'8), frequently republished in various languages, with additions (English by Robinson, Boston, 1882); and *Commentaire littéral sur tous les livres de l'Ancien et du Nouveau Testament* (reprinted, Paris, 1718, 26 vols. 4to).

CALMON, Marc Antoine, a French political economist, born in the department of Lot in 1815. He studied law, and was a member of the chamber of deputies in 1846-'8. In 1871 President Thiers appointed him under-secretary of the interior; in February, 1872, he was elected to the academy of moral and political sciences, and in December succeeded Léon Say as prefect of the Seine. His principal works are *Histoire parlementaire des finances de la restauration* (2 vols., 1865), and *Études des finances de l'Angleterre depuis la réforme de Robert Peel jusqu'en 1869* (1870).

CALMUCKS, a people of the Mongol race, inhabiting parts of the Russian and Chinese empires. They were formerly called Eleutes; the Tartars call them Khalimik, or apostates; and they call themselves Derben Eret, or the Four Allies. There are four tribes: the Khoshots, who inhabit eastern Thibet and chiefly the environs of the Koko Nor, which they regard as their native seat; the Dzungars, giving their name to the country of Dzungaria, and formerly the richest and most powerful; the Derbets, or Tchoros, who migrated from Dzungaria in 1621, established themselves on the upper Tobol, became vassals of Russia, and during the last century took possession of the steppe be-

tween the Don and the Volga, and are associated with the Cossacks of the Don; and the Torgots, or primitive tribe of Dzungaria, who migrated to the Volga to the number of 55,000 families in 1662, but, in consequence of vexations received from Russian agents, returned in 1771 to the banks of the Emba. The Calmucks are described as one of the ugliest in appearance of all the tribes of men. They are of medium size, robust and broad in the shoulders. Their complexion is swarthy, face flat, fissure of the eyelids narrow and oblique, and the eyes small, black, and far apart; nose depressed, nostrils wide, lips thick and protruding, teeth white and regular, ears long and prominent, head large and flat, and hair coarse and black. They have bow legs, with the feet turned in toward each other. Their ugliness is their title to purity of race. The mar-



Calmuck Costumes.

riages that some of the Cossacks have contracted with them have produced handsome women. Their language is harsh and abounds in gutturals. They are descendants of the Scythian barbarians of antiquity, and perhaps of the Huns who under Attila terrified the nations of Europe as much by their hideous aspect as by their ferocity. A small number of the Calmucks have adopted Christianity or Mohammedanism, but the religion of the great majority of them is the Lamaic form of Buddhism, with some variations of their own, under the supremacy of the Dalai Lama of Thibet. They are taught to obey their parents, and to treat their wives and elders with respect. Theft is punishable by castigation, and murder for the first two times by fine and branding. The Calmucks are nomads, moving about in *khotons* (tribes). Their tents are of a conical shape; the floor is covered with a carpet of felt, and in winter with the skins of animals. The household

idols are placed on a kind of altar made of bags, coffers, and horse equipage. Their costume consists of a long caftan, a short jacket, trousers, and boots. Their arms are bows and arrows, scimitars, and lances; they rarely use guns, although gunpowder has been known to them from time immemorial. Divorce is forbidden by law, but usage allows a man to send away his wife. At eight years of age the boys are sent to the priest, who teaches them to read and write. They marry early, the males at 15, the females at 13. The marriage ceremony consists in the couple holding a shoulder of mutton wrapped in a cloth, and pledging their troth before the idols. They are extremely superstitious, and will never enter upon any important transaction without previously consulting a priest. They are not deficient in intelligence, have a strong memory and great keenness of the senses, especially that of sight. They do not reckon from any fixed date, but count by cycles of 12 years, to which they give the name of some animal. The year is composed of 18 months, each of which also bears the name of some animal.

CALOMARDE, *Francisco Tadeo*, count de, a Spanish statesman, born at Villal in Aragon about 1775, died in Toulouse, France, in June, 1842. He was employed in the office of the minister of justice, and was made chief of this department during the time when the central junta, in order to avoid the armies of Napoleon, sat at Seville, and afterward at Cadiz. In 1814, on the return of Ferdinand VII., Calomarde was made chief secretary for the Indies. Here he was convicted of bribery, and banished to Toledo, and afterward to Pamplona. In 1828 he was made secretary to the regency, and subsequently minister of justice. He organized the corps of royalist volunteers, recalled the Jesuits, reopened the convents, and closed the universities. In 1832, when Ferdinand was recovering from a dangerous illness, but lingered in a semi-idiotic condition, Calomarde extorted from him his signature to an act by which he reestablished the Salic law of succession in favor of Don Carlos. When Ferdinand revealed this fraudulent proceeding, Calomarde was banished to his seat in Aragon, and only escaped imprisonment by fleeing to France, where he passed the rest of his days in obscurity.

CALOMEL. Mercury combines with chlorine in two proportions, forming the subchloride or calomel, and the bichloride or corrosive sublimate, the one consisting of one equivalent of chlorine and two of mercury, Hg_2Cl , and the other of one equivalent of chlorine and one of mercury, $HgCl$. The name calomel is probably derived from the Greek words *καλός*, fair, and *μέλας*, black; a black mixture being produced in the process of preparing it by rubbing mercury with corrosive sublimate, and this, when subjected to heat, yielding the white sublimate calomel. It occurs as an ore of mercury in the quicksilver mines of Idria in Car-

niola, Almaden in Spain, and other localities. It is in the form of a crystalline sublimation, coating other substances, and of granular structure. It is also crystallized in quadrangular prisms, of yellowish gray and ash-gray colors. Its hardness is 1 to 2, and specific gravity 6.482.—As prepared for medicinal purposes, calomel is either obtained as a powder by precipitation, or reduced to a powdered state from the crystalline cake obtained by sublimation. It is a substance without taste or smell, insoluble in water, ether, and alcohol, and becomes black by exposure, without undergoing chemical change. For this reason it is necessary to keep it protected from the light. It requires a higher temperature than corrosive sublimate to volatilize it, and in the sublimation a portion is converted into mercury and the bichloride. By its entirely subliming when pure, non-volatile substances that may have been mixed with it, such as salts of lime, barytes, or lead, may be detected. As calomel is liable to be contaminated with corrosive sublimate, by which mixture it may produce the most dangerous consequences, it is especially important to test it for this salt. A buff color is an indication of freedom from corrosive sublimate, but the very purest calomel, as that called Jewell's, is perfectly white. If calomel is washed in warm distilled water, and a white precipitate should fall on the addition of ammonia, this indicates the presence of corrosive sublimate. Caustic potash may also be used instead of ammonia, and will give when corrosive sublimate is present a yellow precipitate.—Various processes are given in the pharmacopœias for this preparation. The most common method is by sublimation. This may be done by mixing four parts of corrosive sublimate with three parts of mercury, and rubbing them together until the metallic globules entirely disappear, and then subliming. The product should be powdered and washed with boiling water to free it from corrosive sublimate. The process of the "United States Pharmacopœia" is as follows: "Take of mercury 4 lbs., sulphuric acid 3 lbs., chloride of sodium 1½ lb., distilled water a sufficient quantity. Boil 2 lbs. of the mercury with the sulphuric acid until a dry, white mass is left. Rub this, when cold, with the remainder of the mercury in an earthenware mortar, and they are thoroughly mixed; then add the chloride of sodium, and rub it with the other ingredients till all the globules disappear; afterward sublime. Reduce the sublimed matter to a very fine powder, and wash it frequently with boiling distilled water, till the washings afford no precipitate upon the addition of solution of ammonia; then dry it." A mode of preparation in the wet way is recommended by Prof. Wheeler in the "Chemical Gazette" of July, 1854. The commercial corrosive sublimate is dissolved in water heated to 122° F., and sulphurous acid gas, obtained by heating coarse charcoal powder with concentrated

sulphuric acid, is passed through the hot saturated solution. Calomel in the form of a delicate powder and of a dazzling whiteness is precipitated. The liquid, when saturated with the gas, is digested for a time, and when cooled is filtered from the calomel, which is afterward washed. This process has the advantage that it is easily available for making calomel in small quantities. The calomel of Joseph Jewell of London, sometimes called Howard's, which possesses the highest reputation, is prepared by causing the vapor to come in contact with steam in a large receiver. It is thus entirely washed from corrosive sublimate, at the same time that it is condensed into an impalpable powder. Its extreme fineness appears to give it more activity as a medicine than is possessed by the calomel obtained by levigation and elutriation.—Calomel is used in medicine to obtain many of the effects of mercury. It is administered in doses of one, to ten or more grains, as a cathartic, being supposed to have a special action upon the liver. This is however not proved, and is doubted by many. In smaller doses more frequently repeated, it produces the constitutional effects of mercury; and if too long retained, or given to persons possessing a peculiar susceptibility, a single dose may give rise to disagreeable effects. Calomel is rendered soluble in the intestines by the albuminous secretions, and perhaps partly by the alkaline chlorides. It has been supposed that these salts convert a portion of the protochloride or subchloride (calomel) into the bichloride of mercury (corrosive sublimate) at the temperature of the body; but experiments have shown that this does not take place, at least out of the body. This conversion may however take place from the action of nitro-muriatic acid, hydrocyanic acid, bitter almonds, or cherry laurel water, and it should therefore not be prescribed with these substances. Calomel is incompatible with alkalies, alkaline earths, alkaline carbonates, soaps, and hydrosulphates.—There are few diseases in which calomel has not been largely employed. Such various views are held in regard to its usefulness that it would be difficult to reconcile them, or even to properly state them within appropriate limits. The sedative and alterative actions of calomel, which seem to be something distinct from its specific mercurial effect, are those which seem the most hypothetical. It is safe to say, however, that the use of calomel by the greater part of the medical profession has vastly diminished of late years, probably to the advantage of the community.

CALONNE, Charles Alexandre de, a French courtier and minister of state, born at Douai in 1734, died in Paris, Oct. 30, 1802. He studied law, and in 1763 became master of requests. In 1768 he was made intendant of Metz; and in 1783, through the influence of the count de Vergennes, secretary for foreign affairs, and of the second brother of the king, the count of Artois, he procured the appoint-

ment of comptroller general of finance. In this office he brought about at once a seeming prosperity by the dexterous management of extraordinary resources, the frequent and at first successful negotiation of loans, and the exhaustion of all branches of the revenue. Such a system, the only consequence of which was to increase the deficit at a fearful rate, could not last long, and Calonne in 1786 advised the summoning an assembly of notables. The session opened Feb. 2, 1787; the comptroller candidly acknowledged that within the last few years the loans had amounted to 1,250,000,000 livres, while the annual deficit had increased to 115,000,000, and declared that the only remedy was to reform altogether the financial system by extending the taxes over the property of the nobles and clergy. Upon these disclosures the king at once dismissed him from office and exiled him to Lorraine. He afterward removed to England, where he wrote several memoirs justificative of his administration. He subsequently became a most active agent of the French *émigrés* at Coblenz, and an adviser of his protector, the count of Artois. He ultimately separated from this party, and returned to France, where he died a few weeks afterward. With unquestionable ability he combined a most extraordinary levity of character and manner. His most notable publication was *Tableau de l'Europe en novembre*, 1795 (12mo, London, 1796).

CALORIC. See **HEAT**.

CALORIC ENGINE, a prime mover driven directly by heat, without the intervention of steam. The first advantage of such engines is evidently the absence of steam boilers and the dangers incident to their use; and a second is the avoidance of the loss connected with the change of heat into motion by the intervention of steam, chiefly due to the great specific heat of water, and the still greater consumption of heat as latent heat in the act of evaporation. This is one of the causes that prevent the best steam engine from giving one tenth of the theoretical mechanical equivalent of the heat produced by the fuel consumed. Thus far, however, the results obtained from caloric engines have not answered the high expectations of their inventors and others. There are at present two kinds of such engines in use: first, those worked by the force of expansion of atmospheric air when heated, and secondly, those worked by the expansion of the products of combustion. Montgolfier in France, the inventor of the hot air balloon, was also the first, a century ago, to attempt to apply the expansion of heated air as a motive power; but it was not till 1816 that the invention assumed a practical shape through the labors of Dr. Stirling in England, who had then a caloric engine in use to pump water from a quarry, and in 1818 obtained a patent for it. In 1827 a more efficient form of this kind of engine was employed by the Messrs. Stirling of Scotland; and in the same year Parkinson and Crosby of Lon-

don constructed such an engine, in which a gas flame was used to generate the heat. Niepce of France, the collaborer of Daguerre in his photographic researches, also entered the field; and in 1833 Lieut. John Ericsson, while residing in England, brought out his first caloric engine.—The principle on which caloric engines are based is that when air is heated, and by confinement prevented from expanding, it will exert a pressure against the walls of the vessel in which it is contained, increasing with the temperature exactly in the same ratio as the air would expand if not confined. As air at 32° F., under a pressure of one atmosphere, expands to double its volume when heated to 522°, it exerts then a pressure of two atmospheres; at 1011°, of three atmospheres, &c. The air being enclosed in a cylinder, with a movable heavy piston, this pressure will raise the piston with the force of 15 or 80 lbs. per square inch; and if then the air below is cooled or allowed to escape, the piston will move back downward by its own weight. This is the simplest form of caloric engine, and entirely similar to the oldest (Newcomen's) steam engines. As the specific heat of the air is very small, it takes little heat to expand it, compared with that required to make steam from water; and this is the chief reason why in later times many practical minds have given their attention to the solution of this problem; several kinds of engines have resulted. The first caloric engine of Ericsson consisted of two cylinders and pistons of different sizes; the piston rods were so connected by a walking beam, that the ascent of one corresponded with the descent of the other (see fig. 1). The air in the small cylinder A was by the descent of its piston driven into the larger cylinder, but during its passage heated and thus expanded in a proper appa-

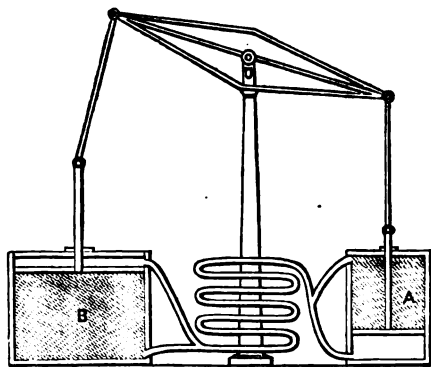


FIG. 1.—Ericsson's First Caloric Engine.

ratus by a fire; this expansion being more than necessary to fill the large cylinder B, it exerted a pressure on its piston exceeding that on the smaller piston A. At the return stroke the hot air escaped from B, and a new supply of cold air was taken up in A by proper valves.

The improved Ericsson caloric engine, which he introduced in 1850, is represented in fig. 2. The cylinder A contains the fire box B, out of which the products of combustion pass through

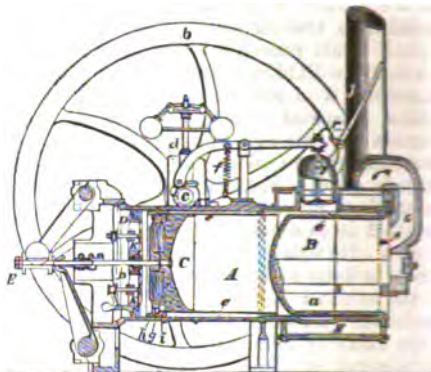


FIG. 2.—Ericsson's Improved Engine.

the channel G around the cylinder in the jacket H, and after heating those parts goes up the chimney J. The cylinder A is open at the other end, and possesses two pistons, the supply piston C, protected by non-conductors, and carrying a cap of light metal *e e*, fitting over the fire box B; and the working piston D, with two valves *k*. Two rods, not visible in the figure, are attached to the latter piston, which set the fly wheel *b* in motion by means of cranks acting on its axle *c*, and which at the same time, by an ingenious system of levers, move the rod E C and the supply piston C in such a manner that it moves through twice the length of stroke of the working piston D, and is always slightly ahead in its stroke. The working piston carries also a valve ring *g*, which alternately closes and opens the communication of the space between the pistons D and C with the space A. The valves *k* in the piston D are opened by an excess of pressure from without, and *vice versa*; the valve F, on the contrary, is opened by a projection on the axis *e* and closed by the spring *f*. If now the pistons are moving from left to right, the space between D and C enlarges by the more rapid motion of C, and the valves *k* admit cold air, while the air in the space A and around the cap *e e* escapes by the valve F. At the return stroke from right to left this valve F closes: the valve ring *g* opens and permits the air between the pistons to flow into the space A, but in order to reach it, the cold air must pass the space between the cap *e e*, the outer cylinder, and the hot sides of the fire box B. Notwithstanding the short time that this contact lasts, the air takes a temperature of about 490° F., and this causes an increase of bulk of nearly double the volume, without pressure on the piston C, as the air passes by the annular valve *g* and fills the space between the pistons C and D. The pressure of this heated air on the piston D increases rapidly with the motion of the

pistons to a maximum, which takes place when they have attained their greatest velocity; from this point to the end of the stroke the tension is reduced to about the atmospheric pressure. It is seen that the latter motion, produced by inward pressure on the piston D, is the power which drives the engine. Many modifications have been made of the principles on which this arrangement is founded, but the high expectations entertained in regard to its economy, where a considerable power is required, have by no means been realized. About 1853 a large ship was built in New York, called the *Ericsson*, provided with caloric engines of the most colossal size, constructed under the supervision of the inventor; but the experiment was unsuccessful, and the owners were compelled to substitute steam for the caloric engine.—At present such engines are only used where a small power, say two or one horse or less, is required. For such purposes the second kind of caloric engines above referred to, in which the expansion of the products of combustion is utilized, has been the most successful. An engine of this class, that of Roper, is represented in section in fig. 3, and in perspective in fig. 4. The cold air is drawn in by the air pump at the left, through the opening A, its

which the packing is only at the top around the portion marked 1, in order to keep it at a dis-

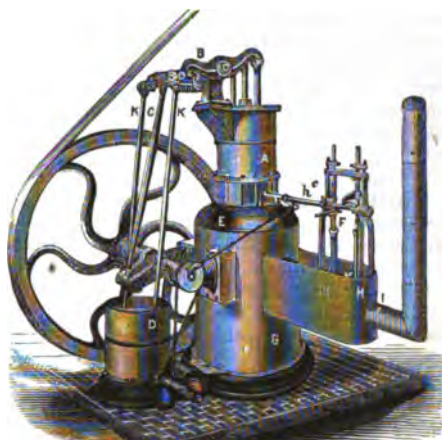


FIG. 4.—Roper's Caloric Engine (in perspective).

tance from the fire and heat, which otherwise would soon destroy it.

CALORIMETER (Lat. *calor*, heat, and Gr. *μέτρον*, measure), an instrument for measuring quantities of heat, without making any assumption as to what heat is. One of the first employed for this purpose was contrived by Lavoisier and Laplace, and was directed to determining the comparative quantity of heat developed by the combustion of definite amounts of fuel. The combustion was effected in a cylinder, which was let down into a larger one filled around with pounded ice. Another cylinder outside of all also contained ice, which prevented that in the middle cylinder from being affected by the external temperature. The heat from the innermost vessel caused the ice to melt in the cylinder next to it, and the water thus produced ran off through a pipe passing through the bottom. The practical application of this principle, however, did not give correct results, all the water not leaving the ice, and on account of the relatively large quantity required of the material to be examined and the consequent impossibility of determining the specific heat of many rare substances. Bunsen in 1871 modified the apparatus in a way that enabled him to measure the volume of ice melted by the contraction which this ice undergoes on liquefaction. Count Rumford's method was to substitute water for ice, and to determine by delicate thermometers the increase of temperature in a definite weight of this liquid by the absorption of the heat. Other forms of apparatus have been invented by Dulong, Favre, Silbermann, Regnault, Despretz, and others.

CALOVIVUS (originally **KALAU**), **Abraham**, a German Lutheran divine, born at Mohrungen, in Prussia, April 16, 1612, died in Wittenberg, Feb. 25, 1686. He was first a teacher in Rosstock, in 1637 a professor at Königsberg, in 1648 rector at Dantzic, and after 1650 profes-

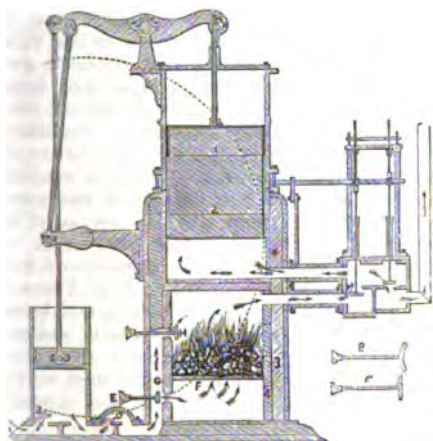


FIG. 3.—Roper's Caloric Engine (section).

return being prevented by the valve B, and forced into the furnace through the valve D. Two dampers, E and H, serve to pass the air either under the grate through the fire or partially over the fire. This air, being heated and mingled with the products of combustion, carbonic acid, watery vapor, &c., passes by the channels indicated by the arrows under the working piston, raising it by the difference in pressure on its large surface, with the small surface of the air pump; by the return or down stroke the air is expelled by the opening of the proper valves through the upward chimney seen at the right hand. This return stroke is made by the momentum of a large fly wheel. The piston consists of a long hollow drum, of

sor of theology at Wittenberg. He was engaged in numerous theological controversies, conducted with much intemperance on each side; was a rigid adherent of his sect, and opposed the Socinians, and also the conciliatory views of George Calixtus, to which he was the first to apply the name of Syncretism. Among his principal works were: *Systema Locorum Theologicorum* (Wittenberg, 12 parts, 1665-'77); *Apodixis Articulorum Fidei* (1686); *Historia Syncretistica* (1682).

CALOYERS, or *Calogeri* (Gr. *καλός γέρον*, a handsome old man), Greek monks, mostly of the order of St. Basil. Their principal convents are on Mount Athos, and are especially resorted to by young men of good family, who find there excellent teaching and a reputable mode of life. The pupils not only read the Greek fathers, but other Christian writings; and those who desire it receive a systematic course of theological instruction. The regular clergy of the Greek church is generally recruited here. Those who prefer monastic life are bound to celibacy, to abstain from meat, and to observe four lents in the year, besides other fasts. They wear a dark cassock, with a belt and a flat cap of the same hue. This is also the costume of the secular clergy, except a white band round the lower part of the cap. Some convents of Caloyers are to be found in the Morea; but they are in point of learning and discipline inferior to their brethren in the north. Among the Caloyers, besides those who live in congregations, there are anchorets, who prefer dwelling alone, or with one or two companions, in hermitages; and recluses, who live in grottoes or caverns, on alms furnished to them by the monasteries. There are also convents of female Caloyers.

CALPE, the ancient name of the rock of Gibraltar, at the S. extremity of Spain, the northern of the two hills called by the ancients the pillars of Hercules. Across the straits of Gibraltar, on the African coast, was Abyla, the southern pillar.

CALPEE, or *Kalpee*, a town of British India, in the district of Bundelcund, province of Doab, on the right bank of the Jumna, 45 m. S. W. of Cawnpore; pop. about 25,000. It is a large but ill-built town, the houses being constructed of mud or of conglomerate, with a fort commanding the river, but of no great strength. It is the depot for the cotton trade of Bundelcund, and is famous for the manufacture of remarkably fine refined sugar. Paper making is also carried on to some extent. Calpee was taken from the Maharrattas by the British in 1778, was subsequently relinquished, and in 1802 was again acquired by the East India company by the treaty of Bassein. It was at that time occupied by Nana Govind Row, jaghirdar of Jaloon, who refused to give it up to the British, and was accordingly besieged, and finally forced into submission. In 1858 Sir Hugh Rose captured the town from the sepoys, after some hard fighting.

CALPURNIUS, *Titus*, a Latin pastoral poet, born in Sicily, lived near the end of the 3d century. Eleven eclogues bearing his name are extant. Little is known of his life, and his eclogues have been by critics variously divided and distributed between himself, his contemporaries, and his copyists. There is some resemblance in style between these eclogues and those of Virgil.

CALTAGIRONE, or *Calatagiro*, a city of Sicily, 84 m. S. W. of Catania; pop. about 24,000. It is built on the summit of a steep mountain 1,600 ft. high, and with its suburbs covers a considerable extent of ground. It is the see of a bishop, and is one of the wealthiest and best built towns on the island. Its inhabitants excel in all the useful arts, and many of them find employment in the potteries and cotton factories of the place. There are several churches, palaces, convents, and a royal college. The town was fortified by the Saracens, and taken from them by the Genoese. Roger Guiscard granted it many privileges.

CALTANISSETTA. I. A province of central Sicily, bounded N. by Palermo, E. and S. E. by Catania, S. by the Mediterranean, and S. W. and W. by Girgenti; area, 1,455 sq. m.; pop. in 1872, 230,066. It comprises the three districts of Caltanissetta, Piazza Armerina, and Terra Nova di Sicilia. Mountains extend along the N. border. The principal river is the Salso. The soil is very fertile, and produces good wine, olive oil, almonds, cotton, and hemp. Iron, sulphur, excellent marble, several kinds of agate, and alabaster are found. The inhabitants are chiefly occupied with agriculture and cattle raising. Among the industrial establishments are several iron founderies and manufactories of chemicals. II. The capital of the province, situated on a high plain near the right bank of the Salso, on the railroad from Girgenti to Catania, 65 m. S. E. of Palermo; pop. about 20,000. It is well built, with broad straight streets, a handsome square, and several fine edifices. In its vicinity are a small volcano which emits water and sand accompanied by jets of hydrogen gas, and extensive sulphur works.

CALUMET, an E. county of Wisconsin, along the E. shore of Winnebago lake; area, 360 sq. m.; pop. in 1870, 12,335. The surface is mountainous, a high ridge running across the county nearly parallel with the lake. The soil is fertile, timber is abundant, and pasturage is good. The chief productions in 1870 were 340,040 bushels of wheat, 42,844 of Indian corn, 175,294 of oats, 13,230 tons of hay, 305,336 lbs. of butter, 84,801 of wool, and 20,000 of hops. There were 2,776 horses, 4,186 milk cows, 4,877 other cattle, 9,488 sheep, and 5,650 swine. Capital, Ohlton.

CALUMICK, or *Calumet*, a river which rises in Porter co., Ind., flows eastward into Illinois, and there divides. One of its branches enters Lake Michigan a few miles S. of Chicago; the other makes a bend, runs eastward par-

allel with its former course, and only 8 or 4 m. N. of it recrosses the Indiana boundary, and discharges its waters into Lake Michigan, in Lake county.

CALVADOS, a department of France, bounded N. by the English channel, E. by the department of Eure, S. by Orne, and W. by La Manche; area, 2,180 sq. m.; pop. in 1872, 454,012. It is formed from a part of the old province of Normandy, and takes its name from a reef of rocks which extends about 20 m. along the coast. The coast has bays, and is in some parts low and sandy, in others characterized by bluffs and headlands. The interior is a fertile, rolling country, becoming somewhat hilly toward the south. The rivers run N. to the channel, and are the Touques, Dives, Orne, Seulle, and Drôme, none of which are navigable for any considerable distance. Agriculture is prosperous, and large crops of wheat are raised. Apples are cultivated for cider. The pasturage is excellent, and cattle are fattened for the markets of Paris, Rouen, and Caen. Coal is mined at Littry, and iron, marble, and slate are found. The principal manufactures are lace, linen, cutlery, cotton cloth, earthenware, and hats. There are extensive oyster beds on the coast, and the mackerel and herring fisheries are of some importance. The railway from Ocherbourg traverses the department to the mouth of the Seine, and the export trade is mostly carried on through Havre. The department is divided into the arrondissements of Caen, Bayeux, Vire, Falaise, Lisieux, and Pont-l'Évêque. Capital, Caen.

CALVAERT, or **Calvart**, **Denis**, called by the Italians **Fiammingo**, a Flemish painter of the Bolognese school, born in Antwerp in 1555, died in Bologna in 1619. He had a school in Bologna, thronged by pupils, including Guido, Albano, and Domenichino.

CALVARY (the Latin translation of the Hebrew name *Golgotha*, a skull), a locality N. of Jerusalem and outside the walls. The place took this name either from being a mound shaped like a skull, or from its being the place of public executions. It was the scene of the crucifixion of Christ, whose body was laid in a sepulchre prepared in a garden near by, which belonged to Joseph of Arimathea, a secret disciple. (See **JERUSALEM**.)

CALVERT, a S. county of Maryland, on the W. shore of Chesapeake bay; area, 250 sq. m.; pop. in 1870, 9,865, of whom 5,538 were colored. The Patuxent river forms its W. boundary, and falls into the bay at the S. extremity of the county. The surface is rolling; the soil is good, and much improved by the application of marl, which is found here in considerable quantity. The chief productions in 1870 were 38,623 bushels of wheat, 178,409 of Indian corn, 28,740 of oats, and 3,158,200 lbs. of tobacco. There were 1,814 horses, 1,280 milch cows, 2,807 other cattle, 3,109 sheep, and 4,723 swine. Capital, Prince Frederick.

CALVERT. **I. George**, the first Lord Baltimore, born at Kipling in Yorkshire about

1580, died in London, April 15, 1632. He graduated at Oxford in 1597, when but 17 years old, was sent abroad to travel, and on his return became secretary of Robert Cecil, afterward earl of Salisbury. Cecil procured for Calvert one of the clerkships of the privy council, and in 1617 he was knighted. At length he was appointed one of the two secretaries of state, and in 1620 he was granted an annual pension of £1,000. In 1624 he resigned his office, freely confessing to the king that he had become a Roman Catholic. James I., however, retained Calvert in the privy council, and in 1625 made him baron of Baltimore, in the Irish peerage. He had obtained a patent from King James creating him proprietor of a part of the island of Newfoundland, with all the rights and privileges of nobility. To this region, which was styled Ferryland, he sent a colony in 1621, and he spent of his own fortune £25,000 in building warehouses and granaries, as well as a superb mansion for himself. He followed in 1625, about the time of King James's death, but was completely disappointed with Newfoundland, the climate proving too severe and the soil too rugged. In 1628 he visited the Virginia settlements and explored Chesapeake bay. He was delighted with the country, but the church of England party had full sway, and the authorities tendered to him the oath of supremacy, which as a Roman Catholic he could not take. From 1628 to 1632 little is known respecting him, but he is supposed to have returned to Newfoundland, as history relates that in the war between England and France he rescued 20 sail of fishing vessels (those of Newfoundland at the time being upward of 250 in number), after they had been captured by a French squadron. He returned to England, and in 1632 obtained from the king a renewal of his former charter, with the territory now forming the states of Maryland and Delaware; but Lord Baltimore died before the papers could be duly executed, and they were issued, June 20, 1632, to his son Cecilus. **II. Cecilius**, second Lord Baltimore, son of the preceding, born about 1608, died in 1676. The charter which had been intended for his father was executed for him by the command of Charles I. It conferred on Lord Baltimore and his heirs for ever absolute ownership of the territory granted, and also civil and ecclesiastical powers of a feudal nature. The name first intended for the colony was *Crescentia*, but Maryland was adopted instead, in compliment to the queen, Henrietta Maria. By the charter there was to be an annual payment of two Indian arrows, by which Lord Baltimore acknowledged that the original title to the land was still in the possession of the king, and that the soil granted to him yet belonged to the British empire. Entire exemption from taxation was conceded to the colonists. Lord Baltimore did not emigrate to America, but gave the management of the colony to his brother. **III. Leonard**, brother of the

preceding, first governor of Maryland, born about 1606, died June 9, 1647. He conducted the first expedition to Maryland, which consisted of about 200 persons, among whom were three Jesuits. On Nov. 22, 1633 (18 years after the first voyage of the Mayflower to Plymouth), they sailed from Cowes, Isle of Wight, in two small vessels: the Ark, a ship of 800 tons, and the Dove, Lord Baltimore's pinnace, of about 50 tons. They sailed by way of the Canary islands, and after touching at Barbadoes and the neighboring islands, they reached Point Comfort in Virginia, Feb. 24, 1634. Here they were entertained for some days, and on March 8 sailed up the Chesapeake and into the Potomac, landing at an island which they called St. Clement's, and on the 25th of the month, "the day of Annunciation of the Holy Virgin Mary, offered in this island, for the first time in this region of the world, the sacrifice of the mass." A large cross hewn from a tree was then set up, and they "raised it a trophy to Christ the Saviour, humbly chanting on bended knees, and with deep emotion, the litany of the cross." Proceeding from this island about nine leagues toward the north, they entered a river which they called St. George's. They landed on the right bank, and gave the name of St. Mary to the intended city, with appropriate religious and military ceremonies, March 27, 1634. Of this city of St. Mary's scarce a trace remains, and by a stranger even its site would be unnoticed. While the missionaries were making friends with the Indian tribes, Calvert found much to harass him. Before his arrival Kent island in Chesapeake bay, situated nearly in the centre of his province, had been occupied by a certain William Clayborne; and when the patent was made out Kent island became a part of Maryland, and Clayborne owed allegiance to Calvert as proprietary. Clayborne, however, entered upon hostilities against the settlers at St. Mary's, and there is reason to believe that he was abetted in this course by the Virginian authorities at Jamestown, who were jealous of the colony of Maryland. Clayborne fitted out an armed pinnace, manned by 14 men, and on April 28, 1635, his force engaged two other pinnaces prepared by Governor Calvert to resist his aggression. Clayborne's vessel was captured with a loss of several men, and he himself fled to Virginia, whence he was deported to England. In 1638 he presented a petition to the king, setting forth his grievances, which however obtained him nothing, and he returned to Virginia. His property on Kent island had meanwhile been declared forfeited by the provincial assembly of Maryland; he petitioned for its restoration, and was refused. Lord Baltimore designed that the lands should be owned in large masses, and desired to found a feudal nobility with hereditary titles and privileges. Had his special order of commission to his brother, dated at Portsmouth, Aug. 8, 1636,

been fully carried out, a great part of Maryland would have been parcelled out in grants of 2,000 or 8,000 acres of land, giving to their proprietors not only the right of soil, but of holding courts leet and courts baron to decide upon personal claims, and also of property. These rights of jurisdiction were to descend from the original owner to his heirs. Primogeniture, and hereditary legislation, such as is perpetuated by a house of lords, were to be established, and a project for titles and dignities had been sketched. In the charter, however, there was a provision which in effect nullified the one for creating an aristocracy, inasmuch as it prescribed that laws could only be made with "the advice, assent, and approbation of the freemen of said province, or of the greater part of them, or of their delegates or deputies." The idea of founding an aristocracy seems from the very first to have been of no effect, as no single title was ever created, and none recognized but that of the proprietary himself, although in some of the early manors baronial courts were held. The manors were soon subdivided among the different descendants of the original proprietors, and the last one ceased to exist in its entirety with Charles Carroll of Carrollton. In addition to the fact that Lord Baltimore remained in England, which prevented him from legislating for the colony understandingly, the charter did not clearly express whether the laws were to be originated by the colonists or the proprietary. On this account, for several years the colony held together without any laws at all, but in great danger of anarchy. Finally Lord Baltimore conceded to the colonists permission to frame their own laws, reserving a veto to himself or his deputy. One of the first acts of the assembly of 1639 was to make the Roman Catholic religion the creed of the state, but permission was given to all bodies of Christians to worship God according to their conscience. Eating flesh in time of Lent was forbidden under penalty of a fine, and this was obligatory on Protestants as well as Catholics. Some ten years after this time another law was passed, which declared that "no person or persons whatsoever, professing to believe in Jesus Christ, shall from henceforth be any way troubled, molested, or discountenanced for and in respect of his or her religion, nor in the free exercise thereof, nor in any way compelled to the belief or exercise of any other religion against his or her consent." Leonard Calvert visited England in 1643, returning the following year. During his absence much trouble was experienced from the conduct of one Ingle, and this man, in connection with Calvert's old enemy Clayborne, harassed the settlement at St. Mary's. The governor on his return found everything in confusion, and although he brought a new commission from his brother confirming him in all his previous powers, Clayborne, in connection with Ingle, regained possession of Kent

island, invaded the western shore of the Chesapeake, and, expelling the proprietary government, compelled Calvert to retire to Virginia. Among other property, the colonial records fell into the hands of these marauders, and were greatly mutilated and in part destroyed. This happened in 1645. Leonard Calvert returned two years after with a strong military force, took possession of Kent island, and re-established his rights over the entire province. But he died soon after, having named Thomas Green to be his successor as governor.

CALVERT, George Henry, an American author, born in Baltimore, Md., Jan. 2, 1808. He graduated at Harvard college in 1828, and afterward studied at Göttingen. On returning to America, he edited for several years the "Baltimore American" newspaper. In 1832 he published "Illustrations of Phrenology," the first American treatise on the subject; and in 1836, a metrical version of Schiller's *Don Carlos*. Since 1848 he has resided in Newport, R. I., of which city he was mayor in 1858. He translated and published in 1845 a portion of the correspondence between Goethe and Schiller, and in 1846 and 1852 published two series of "Scenes and Thoughts in Europe." Among his other publications are "Cabirol," a poem in the stanza of "Don Juan," of which two cantos were published in 1840, and two more in 1864; "An Introduction to Social Science" (1856); "Comedies" (1856); "The Gentleman" (1863); "Anyta and other Poems" (1863); "First Year in Europe" (1867); "Elen, a Poem" (1869); and "Goethe, his Life and Works" (1872).

CALVI, Lazzaro and Pantaleone, two Genoese painters, sons of Agostino Calvi, of whom the former was born in 1502 and died in 1607, and the latter died in 1595. They were educated together under Perino del Vaga, and painted in concert many pictures in Genoa, Monaco, and Naples. Among their other works, "The Continenence of Scipio" is particularly celebrated. Lazzaro was the more inventive of the two, his brother generally working out the details of their joint productions; but his disposition was envious, and his career was marked by atrocious crimes against other painters. Having failed in competition with Cambiaso to secure the execution of the frescoes in the church of San Matteo in Genoa, in a fit of rage he renounced his art, and for 20 years followed the calling of a sailor. At the end of this period he resumed his pencil, and continued to paint until his 85th year.

CALVIN, John, one of the leaders of the reformation, born at Noyon, in northern France, July 10, 1509, died in Geneva, May 27, 1564. His father, Gérard Chauvin, or Cauvin (sometimes written Calvin), was apostolic notary and fiscal procurator in Noyon; and his mother, Jeanne Lanfranc de Cambray, was a woman of strict religious views. He was educated at his father's expense with the children of the noble De Mommor family. At the age of 12

he was presented by one of this family to the benefice of the chapel de la Gesine, to defray the cost of his education for the priesthood. He was already noted for his memory and diligence, as well as for his moral strictness. Among the youth he was known as the "accusative." Removed to Paris with the De Mommor children, he prosecuted his studies in the collège de la Marche and the collège Montaigu. At the age of 18, though he had only received tonsure, he obtained the living of Marteville, which was exchanged in July, 1529, for that of Pont-l'Évêque. He preached short sermons, and continued his studies with the greatest assiduity. After a frugal evening repast, says Beza, he would study till midnight, and in early morning before he rose he would review all he had learned the previous day. His father now changed his plans, and sent his son to Orleans to study law under the eminent jurist Pierre l'Étoile (Peter de Stella). About the same time the influence of his relative Robert Olivetan, who translated the Bible into French, led him to question his traditional faith. By day he pursued the study of the law and by night the study of the Bible, with what commentaries he could command, to resolve his growing doubts. In the law he made such progress that several times in the absence of the professor the youthful student was called to fill his place. From Orleans he went to Bourges, where he continued his legal and theological studies. Melchior Wolmar not only taught him the Greek of the New Testament, but also gave him a further taste of heresy. His position in the university was so prominent that he was requested, though only a student, to draw up an opinion, still extant, upon the divorce of Henry VIII., when that question was submitted to the faculty. But zeal for the truth of God had now become the passion of his life. He cheered all of like mind, resolving their scruples; even when he sought quiet, his retreats became, he says, a public school. The time of indecision was past; such conflicts, such lingering attachment to the past, as we find in Luther and Melancthon, form no part of the recorded experience of John Calvin. The death of his father, in 1528 or 1530, interrupted his university course. For two or three years we hear little of him. From 1529 he was at least a part of the time in Paris struggling with the reformers. In the midst of persecutions he gave up the legal profession and devoted himself to theology. The Sorbonne had just proscribed the tenets of Luther. The congregation of Meaux, of some 800 or 400, was dispersed by violence; Farel had fled; Leclerc was branded and burned; Lefèvre was in Navarre; several persons (seven in 1528) had been burned for heresy. Calvin's sermons, usually ending with the words, "If God be for us, who can be against us?" inspired the timid with new zeal, and the friends of reform looked to him as their champion. At his own expense he now published (April, 1532) an edition of

the *De Clementia* of Seneca, and it has been conjectured that his purpose was to move Francis I. to clemency, but it had little effect. Next came a bolder venture. Nicolas Cop, a friend of Calvin, just chosen rector of the Sorbonne, delivered at the feast of All Saints an oration, supposed to have been written by Calvin, in which he discoursed upon the doctrine of justification by faith alone. The Sorbonne ordered the sermon to be burned, and Cop and Calvin were obliged to depart from Paris. He was welcomed at Nérac by Queen Margaret of Navarre, the sister of Francis I., and the refuge of the persecuted. In Angoulême, with his friend Louis de Tillet, Calvin distributed sermons among the people and began his "Institutes." The venerable Lefèvre d'Étaples, whom he met at Nérac, at the court of Navarre, in 1538, foretold that this young man would "restore the church of France." Returning to Paris at great personal risk, he accepted a challenge of Servetus to discuss the positions advanced in his recent work *De Trinitatis Erroribus*, but Servetus failed to appear. In 1534 Calvin published at Orleans his *Psychopannychia*, in which he argued against a prevalent Anabaptist tenet that the soul was in sleep between death and the resurrection. By the over-zealous dissemination of the reformed "Placards," in 1535, persecution was again aroused. Calvin, desiring a quiet retreat for study, went to Strasburg, and thence to Basel, where Grynaeus and Wolfgang Capiton were working for the reform. Under the latter he studied Hebrew. The French and German reformers were now at work together. The reputation of Calvin as an earnest reformer and one of the most learned men of the age had preceded him. Not only his acumen and learning, but his unsurpassed systematic talents were now exhibited in the "Institutes of the Christian Religion," a work which caused Melancthon to hail him as "the theologian," and which brought into one body of divinity the *disiecta membra* of the reformed opinions, scattered throughout central and western Europe. The immediate occasion of the work was the charges circulated against the reformers, accusing them as a body of holding the distorted opinions and insurrectionary projects with which one class of the Anabaptists had agitated Germany. Francis I. had lent his authority to the stigma. "Silence would now be treason," said Calvin. The Latin preface of the edition of 1536, addressed to this monarch, refutes the charges and defends the reform with such dignity and method, that it takes rank as one of the three immortal prefaces in literature; that of President De Thou to his "History," and of Casaubon to Polybius, being alone compared with it. The first edition of the "Institutes" was probably published in 1535, in French, and anonymously; no copy of it is extant. The edition of 1536 was issued at Basel, in Latin; improved editions appeared during Calvin's life in 1543, 1545, 1549, 1550,

and 1559. Numerous editions have been since published, and translations into most of the European languages, and into Greek and even Arabic. A new impression of the edition of 1759, which is considered the most complete, was brought out by Tholuck in Berlin, 1834-5, and a new edition of Krummacher's German translation of the same appeared in 1834. It has been translated into English by Allen (London, 1818) and by Beveridge (Edinburgh, 1863). In its full form, the "Institutes" is divided into four books, treating successively of the knowledge of God as the Creator and Sovereign of the world, of the knowledge of God as Redeemer in Christ, of participation in the grace of Christ and the fruits thereof, and of the external media (church and sacraments) by which God unites us unto, and retains us in, the fellowship of Christ. In it Calvin elaborates a system of theology, every part of which is based upon the idea that the divine will is supreme. That will, in Calvin's view, though hidden to us, is not arbitrary, but most wise and holy. The human race, corrupted radically in the fall with Adam, has upon it the guilt and impotence of original sin; its redemption can be achieved only through an incarnation and a propitiation; of this redemption only electing grace can make the soul a participant, and such grace once given is never lost; this election can come only from God, and it includes only a part of the race, the rest being left to perdition; election and perdition are both predestinated in the divine plan; that plan is a decree, eternal and unchangeable; all that is external and apparent is but the unfolding of this eternal plan; the church, "our mother," contains only the visible signs and seals of a grace which is essentially invisible; justification is by faith alone, and faith is the gift of God. Such was the stern anatomy of his system of predestination. The polemical astuteness and doctrinal completeness of the "Institutes" gave it an immediate fame. The reform, supposed to be sporadic, was here concentrated in living unity and vigor. Less heed was given to the comparative neglect of human freedom than to the searching exposure of the vanity of human merit. The sovereignty of God was brought to bear against the supremacy of the pope.—Renée de France, daughter of Louis XII., married to Ercole II., duke of Ferrara, imitating the example as she shared the opinions of Margaret of Navarre, invited Calvin to her court, then the refuge of many of the persecuted. Under the name of Charles d'Espeville he here enjoyed for a short time comparative repose, yet winning Madame de Soubise, Anne and Jean de Parthenay, and others, to the new opinions. The vigilant inquisition, already crushing out Italian reform, soon compelled him to retrace his steps. After tarrying a while at Aosta, he went for the last time to his native place, and arranged his family affairs. Prevented by the war in Lorraine from gaining Strasburg by the most direct

route, he went in August, 1536, not without personal peril, to Geneva. Delivered from the domination of the duke of Savoy, this city had received the reformed opinions through the zeal of William Farel, and in August, 1535, established the new service. But the old parties, the Eidgenossen (confederates), and the Mamelukes (Savoyards), reappeared under new forms. The city was demoralized; libertinism as to both faith and morals was popular, though the old *conseil général* had been revived, and had already attempted the prohibition of worldly amusements. But the strict party was in the minority, and Farel, hearing of Calvin's presence in the city, besought him to remain; and when he pleaded his need of repose and desire for study, Farel broke out in a solemn adjuration: "Since you refuse to do the work of the Lord in this church, may the Lord curse the repose you seek, and also your studies!" Calvin yielded, he says, "as if to the voice of the Eternal." At first he would only teach theology, but he preached a sermon, and crowds followed him to secure its repetition; and he was obliged to become one of the pastors. His salary must have been slight, judging from the fact that after six months (Feb. 13, 1537) the council voted him six crowns, "seeing he had not received anything." In conjunction with Farel and Viret, he at once proceeded to the work of organizing the church affairs. In 1537 he published a catechism in French (in Latin in 1538), extracted from his "Institutes," "since to build an edifice that is to last long, the children must be instructed according to their littleness." A "Confession of Faith," with articles of strict discipline annexed, had been approved by the council in November, 1536, and was read in church every Sunday. At a public disputation with the Anabaptists, March 18, 1537, he put them to silence, so that for many years they were no longer heard of. At a disputation in Lausanne he spoke against the real presence, and on the authority due the fathers. A certain Caroli accused him, Farel, and Viret of being Arians, because the words Trinity and person (on which Calvin never insisted) were not in the Genevese creed, but his orthodoxy was amply vindicated at Lausanne and Bern. His great work, however, was the regulation of discipline, according to the principles advocated in his "Institutes." And here he encountered wrathful opposition. Many of the Eidgenossen had joined the reforming party from merely patriotic motives; the remaining partisans of Rome and the Anabaptists made common cause with these Libertines against the plan which was to extend ecclesiastical discipline to all the citizens, banishment being the penalty of obstinacy. Some sumptuary regulations were introduced; games of chance and licentious dances were prohibited anew—they had been repeatedly forbidden since 1487; though Calvin granted that cards and dancing might be innocent in themselves, yet they led to "feuds

and quarrels." The Libertines gained the election of Feb. 3, 1538, and at once forbade the ministers to mingle in politics. The ministers then refused to hold communion at Easter, on account of the prevailing immorality; they further refused to restore certain church festivals, to use the baptismal font, and to give unleavened bread in the supper, though a Lausanne council had recommended these things. Calvin was personally not opposed to these rites, but went with his colleagues. Thereupon, April 23, the council banished Calvin and Farel, who departed, saying, "It is better to obey God than man." Zürich and Bern interceded for them in vain; a popular assembly, May 26, confirmed the decree of the council. And Calvin, though he "loved Geneva as his own soul," was glad to return to the life of a student. Expelled from Geneva, he was welcomed at Strasburg by Bucer. A church of 1,500 French refugees was put under his charge, and adopted his discipline. The city gave him the right of citizenship, afterward prolonged for his life. He was present at the conference between the Roman Catholics and Protestants at Frankfort in 1539, and in that of Worms, adjourned to Ratisbon, in 1541. He prepared a treatise on the Lord's supper (*De Cena*), after a conference with the Lutherans at Hagenau, in 1540, in which he developed his view, intermediate between the Lutheran and Zwinglian, asserting that Christ was spiritually present and spiritually received in the eucharist. He also lectured and published on the Epistle to the Romans, having modern Rome always in view; since Augustine no commentator had entered more fully and directly into the logic of Paul's argument. Crowds of students from all parts of France flocked to his lectures on the Romans, and on John's Gospel. He was scattering seed far and wide. Here, in 1540, he was married to Idelette de Bures, the widow of an Anabaptist, whom he had converted. In this woman he found a most faithful and devoted wife, "who never opposed me," he says, and "always aided me." Idelette died in 1549, and her stern, hard, overworked husband speaks of his solitude and grief in several touching letters still extant.—Two years had now passed since Calvin had been driven out of Geneva, and the city had need of him. He had still continued to cherish its welfare, advising his friends to moderate counsels. When Cardinal Sadolet wrote to the Genevese to entice them back to Rome, Calvin replied with such wisdom as extorted praise even from his opponent. The Anabaptists were again restless. Disorders and tumults increased. Of the four syndics who had procured Calvin's expulsion, one had been hanged as a traitor, another was killed in an attempted flight, and the other two had been driven away. As early as Oct. 22, 1540, the council had vainly urged the disciplinarian to return; to another solicitation he replied, "The Genevese would be insupportable to me,

and I to them." The city procured the intervention of Bern and Basel; Bucer and Farel entreated; the city of Strasburg at last allowed him to go, continuing his salary, which he refused to receive; and Calvin yielded, "offering to God his slain heart as a sacrifice, and forcing himself to obedience." He returned to the city with the acclamation of the people, Sept. 18, 1541, and not only was a "plain house" provided for him, but also "a piece of cloth for a coat." He returned with the full and fair understanding that his discipline was to be carried out. His idea of the proper power and purity of the visible church was much higher than that of his contemporary German reformers; Möhler accuses him of borrowing it from the Roman Catholics. To have a reformed church was his ideal. That reform must embrace not only doctrine and ritual, but also the whole life. The ministry is divinely appointed. Synods of pastors and elders are for the preservation of truth and order. The state is to aid, and not to rule, this spiritual institution, though both church and state concur in the sphere of morals. Rules of discipline conformed to these radical views were adopted by the whole people, Nov. 20, 1541. The presbyterial system was fully inaugurated, which became a model for the government of the reformed churches in other countries. The consistory had twice as many elders (12) as ministers, and these elders were annually elected by the church. The system of representation was thus established, so fruitful in the subsequent political history of Europe. The consistory met every Thursday to consider cases of discipline. A congregation assembled on each Friday for practical religious improvement. The general council elected by the people continued its functions; but it assembled only twice a year, and the real power was gradually absorbed by the lesser council and by the consistory. The latter was the real tribunal of morals, and its inquisitorial sphere extended to the whole population. It could not punish beyond excommunication, but the civil power was expected to do the rest. The system was a bold one, and for a time eminently successful. Accusations, often frivolous, increased. In 1558-'9 there were 414 citations before the consistory. Severe penalties were often inflicted for slight offences; once a person was punished for laughing while John Calvin was preaching. But the effect upon the city was marvellous. It became the most moral town in Europe. It was also the home of letters and the bulwark of orthodoxy. Hooker says, "The wisest that time living could not have bettered the system." Knox, who was three times at Geneva, 1554-'6, declared that "it was the most perfect school of Christ since the days of the apostles." And Montesquieu exhorted the Genevese to celebrate as festivals the day of Calvin's birth and the anniversary of his arrival there. In 1541 Calvin was also appointed on a commission to codify the laws of the state; the code was adopted Jan. 10, 1548. Here, as in the church,

the government was aristocratic, with severe penalties. Ancillon says that his "labors for the civil law give him a higher title to renown than his theological works." The same year he published a new and revised liturgy, which was made the basis of many other reformed liturgies. The public worship was ordered with extreme simplicity, all that appealed merely to the senses and imagination being excluded. Not that he was tenacious in opposition to "things indifferent;" for when consulted in 1555 about the English liturgy, then the occasion of troubles in Frankfort, though he replied that it contained *incepta*, he added the adjective *tolerabiles*. Such power as Calvin now exercised could not be unresisted, except in a thorough despotism with a standing army. The Libertines were strengthened in their opposition to Calvin by many who had united in the invitation for his return to the city, among others Amy Perrin. Some were animated by a feeling of patriotic independence; others held to the gross views of the Familists; all joined in the opposition; blood flowed. Perrin was executed in effigy, in 1555, for trying to seize the government. Gruet was decapitated as a materialist, and an enemy of the state. Berthelier, a son of him who had headed the movement for independence against the duke of Savoy, was excommunicated; he appealed from the consistory to the general council, and the council acquitted him. The trial of strength came. All the clergy remonstrated against the decision of the council. Calvin appeared before the 200, and pleaded in vain for the independence of the church. The council still demanded that Berthelier should receive the communion. On the Sabbath, after the sermon, Calvin exhorted the church to partake of the sacrament, but thundered out that "he would sooner die than offer holy things to the excommunicated." Berthelier did not dare approach the table. The council postponed the final decision. The people in the street still cried, "Slay the alien!" The contest continued for a whole year, but the party of Calvin was strengthened by the naturalization of a large number of Frenchmen, 300 at one time in 1557, and the authority of the reformer was insured. Yet it was far from being absolute even with the consistory, who often opposed his views; in one letter he complains that they even subjected his theological works to the censorship. These ecclesiastical and civil disputes were only a small part of his labors. He was also engaged in perpetual theological disputations. Bolsec, once a Roman Catholic and almoner of the duchess of Ferrara, now a convert to the reformed religion and a physician, disputed his doctrine of predestination. After a sharp controversy he was banished from Geneva, became again a Catholic, and wrote in 1577 a slanderous life of Calvin. The Spanish and Italian anti-Trinitarians made much trouble at Geneva. Geibaldi was banished; Gentilis was led for a time to recant. Lelio

Socinus came to Geneva even after the execution of Servetus, and subsequently corresponded with Calvin on the doctrine of election. The most melancholy case was that of the Spanish physician Servetus, burnt at Geneva in October, 1553. He was arrested by the Catholics at Vienna, and Calvin forwarded papers of Servetus which he had in order to secure his identification and condemnation as a heretic, and threatened that if ever he should come to Geneva he should not be suffered to depart alive. He was condemned by the authorities at Vienne, but escaped and went to Geneva, where he was again tried and condemned to be burned. Calvin interceded in vain to have his punishment changed to decapitation. His condemnation was the act of the council, after a long deliberation, and in accordance with the expressed opinions of other cantons.—Among Calvin's other theological works was an "Antidote," in 1543, to 25 new articles of faith, drawn up by the Sorbonne; another "Antidote," in 1547, to the decrees of the council of Trent; a severe treatise on the "Freedom and Bondage of the Will," against the Roman Catholic Pighius, which had the rare controversial success of convincing his opponent. After prolonged discussions, Zürich and Bern united with Geneva. (1549) in a consensus on the Lord's supper; the Swiss churches generally acceded to it in 1551. But the Lutherans were enraged. Westphal aroused them to opposition. When Lasco's reformed church was driven from England on Mary's accession, it could at first find no resting place in Denmark or Germany; Westphal called them "martyrs of the devil." Calvin made a fierce attack on him and Hesshusius, and rebuked with severity the silence of Melancthon. He could never understand how the Lutheran divines could make their peculiar views of consubstantiation necessary to church fellowship.—The most important part of Calvin's labors was in connection with the new academy of Geneva, inaugurated in 1559, and endowed by the liberality of Bonivard. Such institutions of learning sprung up wherever the reform prospered. At Geneva there were chairs of Hebrew, philology, philosophy, and theology. Beza, the ardent friend and able successor as well as biographer of Calvin, was the first rector of the academy. Calvin taught theology, and students flocked from Scotland, Holland, and Germany. From 6 to 4 o'clock in summer, and from 7 to 4 in winter, the classes were together, excepting at the dinner hour, which was from 10 to 11. The place became a focus for the reformed faith. Calvinism was dispersed all over Europe. "There was not a single day of his life," says Sayous, "in which John Calvin was faithless to his apostolate." His labors were ceaseless and prodigious. Every other week he preached every day, and often on the Sabbath. His sermons were extemporaneous, short and simple, always cogent, solemn, and often tender.

Three times a week he lectured on theology. Every Thursday he presided in the consistory, and on Friday he was present at the congregation. His commentaries cover the larger part of the Old Testament, and all of the new excepting Second and Third John and the Apocalypse. His commentaries on the Psalms and the Pentateuch, and on Paul's epistles, and his lectures on Job, stand in the front rank of Biblical interpretation. Calvin was the counsellor of the reformed churches everywhere, but his chief influence outside of Switzerland was felt in France; its churches looked to him for counsel and received his creed and polity; Coligni greeted him as the leader of the reformation, and concerted with him the first Protestant attempt at missions, that of the Huguenots at Rio de Janeiro, in 1558, which was however broken up in 1558. The wide influence thus begun in life was perpetuated after Calvin's death. His system of doctrine and polity has shaped more minds and entered into more nations than that of any other reformer. In every land it made men strong against the attempted interference of the secular power with the rights of Christians. It gave courage to the Huguenots; it shaped the theology of the Palatinate; it prepared the Dutch for the heroic defence of their national rights; it has controlled Scotland to the present hour; it formed the Puritanism of England; it has been at the basis of the New England character; and everywhere it has led the way in practical reforms. His theology assumed different types in the various countries into which it penetrated, while retaining its fundamental traits. In France, the school of Saumur advocated a general atonement. In Holland, the five points were sharply presented, and Supralapsarianism was partially defended; but here too the Occasian theology of the covenants found a less abstract and a more historical basis for the system of divinity. The Westminster Confession combined the results of a century of controversy in an exposition, fuller than any continental symbol, and to which Scotland and the Presbyterian and Congregational churches of America have in the main adhered. But in the United States the system of Edwards has enlarged and liberalized the theology of Calvin. And in all these countries the love first of religious, and then of civil freedom, has been deeply implanted in the adherents of a theology which elevates man because it exalts God.—Early in 1564 Calvin began to sink under his multiplied cares, and a complication of disorders that had been wearing upon him ever since his youth. On April 27 the lesser council met around his bedside to receive his parting words; the next day the ministers of the city and neighborhood listened for the last time to his affectionate and faithful counsel. Prayers were offered for him in all the churches. He lingered on in intense suffering, yet in the triumph of faith, till May 27, at 8 o'clock in the evening, when he breathed his last. He was buried in the ceme-

tery of Plain Palais; at his own request, no monument was erected, and the exact spot is unknown. His whole earthly wealth, 225 crowns, he bequeathed to his relatives and poor foreigners.—The works of Calvin were first collected in the Geneva edition of 1617, in 12 vols. fol., and afterward in that of Amsterdam, 1671, in 9 vols. fol. A new edition by Baum, Cunitz, and Reuss was commenced at Brunswick in 1868, of which 10 vols. had been issued in 1871. His collected works have been published in English by the Calvin translation society of Edinburgh, in 52 vols. 8vo, completed in 1855. His commentaries were published together in 1561, in 2 vols. 8vo. Tholuck edited his commentary on the New Testament (Halle, 1831-'4). His *Opuscula* were issued in 1562; the best edition is the Genevan of 1597. Parts of his correspondence appeared in 1576, in Beza's "Life of Calvin." De May in 1557 depicted Calvin's career from the Roman Catholic point of view. A "Life of John Calvin," by Elijah Waterman, minister of Bridgeport, Conn., was published in 1818, and a book with the same title by Thomas H. Dyer appeared in London in 1850, and was republished in New York in 1851. The most complete biography is given in Paul Henry's *Leben Johann Calvins, des grossen Reformators* (8 vols., Hamburg, 1835-'44), with a copious appendix of extracts from 544 letters, to which Dr. Henry had access. This work has been translated by Dr. Stebbing, omitting the appendix, in 2 vols. 8vo (London and New York, 1854). Audin's *Histoire de la vie, des ouvrages et des doctrines de Calvin* (8d ed., Paris, 1845) has been translated into English, German, and Italian, and is written from a Roman Catholic point of view. Among the later biographers of Calvin are Tulloch, "Leaders of the Reformation" (new ed., London, 1861); Bungeger, "Calvin, his Life and Works" (Edinburgh, 1862); Stähelin (Elberfeld, 1868); Kampschutte (Leipsic, 1869); Guizot, *Histoire des quatre grands chrétiens français* (2 vols., Paris, 1878). Galiffe, *Quelques pages d'histoire* (Geneva, 1868), makes some contributions to Calvin's biography. For the historical relations of Calvinism, see REFORMED CHURCH.

CALVISIUS, Sethus, a German musician and chronologist, born at Groschleben, in Thuringia, Feb. 21, 1556, died in Leipsic, Nov. 24, 1615. He was poor, and by his musical talents earned the means to visit several of the German universities. He opened a musical school at Pforte, rather than accept a professorship of mathematics, which was offered to him by two universities. His principal works were, *Opus Chronologicum* (1605), *Elenchus Calendarii* (1611), a translation of the Psalms into German verse, and a treatise on music.

CALVUS, Caius Licinius Macer, a Roman orator and poet, a son of the annalist and orator of the same name, born in 82 B. C., died about 47. He left 21 orations, of which but few fragments survive. One of these, against Va-

tinus, whose counsel was Cicero, produced so powerful an effect that the accused interrupted the orator and exclaimed, "Judges, am I to be condemned because my accuser is eloquent?" His poems in subject and treatment were similar to those of Catullus.

CALW, or **Kalw**, a town of Württemberg, situated 21 m. W. S. W. of Stuttgart; pop. in 1871, 5,582. It lies in a deep and well wooded valley on both banks of the Nagold, which is crossed here by two bridges, and divides it into the upper and lower towns. It has seven churches, a Latin school, and an important foreign missionary institute. The town church and town house are handsome, particularly the latter, which has a fine hall with an arched roof. It is the chief seat of the lumber trade of the Black Forest, and has a number of woolen and cotton factories. It was in ancient times the capital of the counts of Calw, the wealthiest and most powerful of the Swabian nobles, the ruins of whose castle are still to be seen in the vicinity. Victor II., who was pope from 1055 to 1057, belonged to this family.

CALX, a term at first employed by the alchemists to designate the product obtained by heating a metal in the air. Subsequently it was limited to lime prepared by calcination. (See LIME.)

CALYDON, an ancient city of *Ætolia*, celebrated in the heroic age of Greece. It was founded by *Ætolus* in the land of the *Curetes*, and named after his son *Calydon*. Homer celebrates the fertility of the plain in which *Calydon* was situated near the *Evenus*; and in the ninth book of the *Iliad* he gives a vivid account of one of the battles between the *Calydonians* and the *Curetes*, with whom the *Calydonians* were almost always at war. Famous among the *Calydonians* were *Æneus*, his sons *Tydeus*, *Meleager*, and *Thoas*, the king mentioned by Homer as leader in the Trojan war, and *Diomedes*, son of *Tydeus*. The wild boar hunt in this locality has been celebrated by the poets under the name of the *Calydonian* hunt. (See MELEAGER.) The city was in the possession of the *Achæans* from 891 to 871 B. C., when, after the defeat of the Spartans at *Lætra*, *Epaminondas* restored it to the *Ætolians*. It was still a place of some importance in the time of the conflicts between *Cæsar* and *Pompey*; but *Augustus* after his victory at *Actium* removed the inhabitants to his newly founded city of *Nicopolis*, and presented the statue of *Artemis Laphria*, the goddess worshipped by the *Calydonians*, to the city of *Patræ* in *Achaia*. The site of the city is variously described. Col. Leake discovered ruins, including remains of a wall nearly 2½ miles in circuit, at *Kurtas*, a little E. of the *Evenus* and about 7 m. from *Missolonghi*, on one of the last slopes of *Mt. Aracynthus*, which he supposed to be those of *Calydon*.

CALYMENE (Gr. *καλυμένη*, concealed, so named from the obscure nature of the genus), a genus of trilobites characterized by the fac-

ty of rolling the body into the form of a ball, by bringing the two extremities of the trunk together. In some rock formations they are found thus coiled up in great numbers. They are abundant both in this country and in Europe, their range being among the lower fossiliferous rocks. In some of the species the structure of the eye is beautifully preserved, showing that, in these earliest formed crustaceous animals of the most remote geological periods, the same provisions were made for adapting this member to the peculiar necessities of the animal, that are now seen in the complicated structure of the eye of the butterfly.

CALYPSO, a nymph, according to Homer the daughter of Atlas, who dwelt on the island of Ogygia. When Ulysses was shipwrecked there, she fell in love with him and retained him for seven years, until the gods compelled her to let him continue his journey. She bore two sons to him, and promised him immortality if he would remain, and died of grief after his departure.

CAM, or *Granta*, a river of England, rises in N. Hertfordshire, runs in a N. E. course of about 40 m. through Cambridgeshire, is navigable by small craft as far as Cambridge, and falls into the Ouse 15 m. from the latter city, and about 4 m. from Ely.

CAM, *Diogo*, a Portuguese navigator, born in the second half of the 15th century, died toward the beginning of the 16th. He passed Cape Lopo Gonçalves and Cape Catharina, on the coast of Africa, and placed on the southern shores of the Congo river a *pedra*, or pile of stones, which henceforward served as boundary between the territories explored and those still unknown. He was the first to put himself into personal contact with the population of Congo, and leaving a few Portuguese sailors as hostages behind, he took some of the natives with him to Lisbon. This expedition, which took place in 1484, became of still greater service to science by the astronomical observations of the learned Martin Behaim, who accompanied it. Cam returned to Congo within 15 months, in accordance with a promise which he had made to the natives who went with him to Lisbon, and planted a second *pedra* in lat. 18° S. He penetrated as far as lat. 22°, and on making his appearance at the court of the black king of Congo, he was received with every demonstration of cordiality, and the king sent an ambassador, *Cazuta*, with presents to Lisbon.

CAMALDULES, or *Camaldolensians*, a religious order founded in 1012 by St. Romuald, a Benedictine monk of the ducal house of Ravenna, in the valley of Camaldoli, in the Apennines, near Arezzo. Pope Alexander II. confirmed the order in 1072, and an order of Camaldulensian nuns was founded in 1086. The habit was white. The rule, which was very severe, was modified in 1233 and 1254. The order was divided into monks and hermits. These united at times under one rule, but were generally distinct. In the 18th century they formed five

independent groups, four in various parts of Italy, and one at Grosbois, near Paris. The order disappeared in the troubles of the French revolution, except in Italy, where it subsisted till the general suppression of religious orders. Pope Gregory XVI. was originally a Camaldule.

CAMARGO, *Marie Anne*, a dancer, born in Brussels, April 15, 1710, died in Paris, April 20, 1770. Her father, whose name was De Cuppi, was of an ancient Roman family; her mother belonged to the Spanish house of Camargo. De Cuppi made the arts of dancing and music a means of supporting his family, and brought up one of his children as a painter, another as a musician, and Marie Anne as a dancer, in which art she was instructed by Mlle. Prévost. On appearing on the stage at Brussels she at once became a favorite of the public. She made her début at the opera in Paris in 1726, and became very popular there. The count de Melun abducted her partly by force and partly by persuasion, and kept her for some time a prisoner in his hotel. She retired from the stage in 1784 for some unexplained reason, and returned six years later, when she was received with the utmost enthusiasm. She finally retired in 1751 with a pension of 1,500 francs.

CAMARGUE, *La*, an island of France, which forms the S. W. portion of the department of Bouches-du-Rhône, and lies between the E. and W. mouths of the Rhône; length N. and S., 25 m.; greatest breadth E. and W., 21 m.; area, 250 sq. m. It is a delta of alluvium resting on sand, and is supposed to have been formed since the time of Julius Cæsar. It is protected from the inundations of the river by dikes. In the interior are low lands impregnated with salt, reedy marshes, and large lakes communicating with the sea. The largest of these lakes is Valcares. The river valleys are cultivated, and the remainder of the island is devoted to pasturage. The sheep are wintered on the island, but in spring are driven to the pastures on the Alps. The principal products are corn, fruit, timber, rice, and salt. The vine, olive, and mulberry flourish, and madder is raised. The island gives its name to a species of half-wild cattle and horses which are found upon it and in the neighboring marshes.

CAMARINA, an ancient town on the S. coast of Sicily, near the marsh or lake of the same name, founded by a colony from Syracuse about 600 B. C. It was an exposed position in the Syracusan, Carthaginian, and Roman wars, and was several times taken, retaken, destroyed, and recolonized. It was at last utterly destroyed by the Saracens, who captured it about 850.

CAMARINES. See *Luzon*.

CAMBACÈRES, *Jean Jacques Régis de*, a French statesman, born at Montpellier, Oct. 18, 1753, died in Paris, March 8, 1824. He was educated for the bar, and at the opening of the revolution was sent as member first to the legislative assembly and then to the national convention. During the trial of Louis XVI. it was on

his motion that counsel were allowed to the king, and were also permitted to communicate with him freely. He voted for the condemnation of that monarch, but was in favor of a provisional reprieve, and of death only in case of a hostile invasion. Through the reign of violence which followed he is said to have endeavored to restrain the more arbitrary acts of the body, but he acted with Marat, Robespierre, and Barère. On Jan. 24, 1798, he was chosen secretary to the convention, and it became his duty, in the session of March 26, to report the treason of Dumouriez. After the fall of Robespierre (July, 1794) he was president of the committee of public safety, and endeavored to put an end to the reign of terror. The same year he presented a plan for a civil code, which was always a favorite project with him; but his republicanism became suspected, and he was not successful. He tried unsuccessfully to become a member of the directory, but secured a seat in the council of 500, where he renewed his efforts in behalf of a civil code (1798), which was subsequently made the basis of the *Code Napoléon*. After the movement of the 30th Prairial of the year VII. (June 18, 1799), he accepted the office of minister of justice under the directory. After the *coup d'état* of the 18th Brumaire, in which he had taken no part, Cambacérès was continued by Bonaparte as minister of justice, and was soon after (Dec. 25, 1799) appointed second consul. On the elevation of Napoleon to the imperial dignity he became arch-chancellor of the empire, in which capacity he had to communicate all the emperor's measures to the senate. The grand cordon of the legion of honor and many distinguished foreign orders fell to his lot, and in 1808 he received the title of duke of Parma. He presided over the discussions of the civil code, assisting the committee largely by his legal knowledge, his judgment, and his previous study of the subject. During the campaign of 1813 he was president of the council of regency; but on the approach of the allies in 1814 he repaired to Blois, and from that place sent in his assent to the recall of the Bourbons. For a while afterward he lived in retirement, until Napoleon's escape from Elba and reassumption of power placed him once more in office. He acted as minister of justice and president of the chamber of peers. At the restoration he retired again, taking up his residence at Brussels, where he was permanently exiled, as one of those who had consented to the death of Louis XVI. In 1818, however, he was pardoned, and returned to Paris. He was an adroit politician, an accomplished jurist, and a very skillful diplomatist, but was facile in principle, and the willing instrument of the superior genius of Napoleon. Having been a Jacobin in the revolution, he became an ostentatious aristocrat under the empire, eagerly reviving and displaying the titles and ceremonies of the old régime.

CAMBAY. I. A city of British India, province of Guzerat, situated at the head of the gulf

of Cambay, at the mouth of the Mahée river, in lat. 22° 21' N., lon. 72° 32' E., 75 m. S. N. W. of Surat, and 280 m. N. W. of Bombay; pop. about 10,000, almost equally divided between Hindoos and Mohammedans. It was formerly much larger than at present. There are several mosques, the Jumna Mosqueid, a grand structure 210 ft. square, being the principal, and a number of subterranean temples of the Jains, a sect whose religion formerly predominated in this region. It had formerly a large commerce, and exported silk, chintz goods, and indigo. It still sends to Bombay some grain, indigo, and tobacco, and its jewellers and lapidaries are celebrated for their skill. *El Cuf el*, an inlet of the Indian ocean on the W. coast of India, 82 m. wide at its mouth, and 72 m. long. It is gradually becoming shallower. It is noted for the height of its tides, and receives the Taptee, Nerbudda, Mahée, Subermutty, Bhadar, and other rivers.

CAMBERWELL, a parish of England, county of Surrey, in the S. suburbs of London; pop. in 1871, 111,802. The old village of Camberville is now the business portion of the parish, while the rising ground in the S. and S. E., known as the Grove, Champion, Denmark, and Herne hills, is built up with handsome modern mansions. The parish church, in the later Gothic style, was built about 1520, and enlarged in 1786. There are many other churches and dissenting chapels, a free grammar school founded in 1618, and several charity schools. The parish is intersected by many railways, and the Surrey canal terminates in it.

CAMBIASO, Luca, called *LUCHETTO da GENOVA*, a Genoese artist, born at or near Genoa in 1527, died in Madrid in 1585. His best works are the "Martyrdom of St. George" and the "Rape of the Sabine." At the invitation of Philip II. he visited Spain in 1581, and executed a fine composition, representing the "Assemblage of the Blessed," on the ceiling of the Escorial.

CAMBINI, Giuseppe, an Italian composer, born in Leghorn, Feb. 18, 1746, died in the almshouse at Bicêtre about 1832. He studied under Martini at Bologna, and at Vienna under Haydn, and in 1770 settled in Paris. His life was very irregular, and he finally became a pauper. He composed over 60 symphonies besides innumerable concertos, oratorios, and pieces of instrumental music. Those adapted for the violin were the most successful.

CAMBODIA (Fr. *Cambodge*), a kingdom of Further India, under the protectorate of France, between lat. 10° and 14° N., and lon. 103° and 106° E., bounded N. by Siam, N. E. by Anam, S. E. and S. by French Cochinchina, and S. W. and W. by the gulf of Siam. Its greatest length is about 270 m., greatest breadth about 130 m.; area, about 85,000 sq. m.; pop. estimated at 1,000,000, of which number nearly 60,000 are Anamese, 40,000 Chinese, 40,000 Siamese and Laos; about 10,000 belong to mountain tribes living in a state of almost complete independence.

The principal part of the territory of the kingdom lies in the broad valley of the Mekong or Cambodia river, which has made the region about it one of the most fertile in southern Asia. The extreme eastern and western portions are occupied by mountain ranges. That on the east, high and covered with forests, forms part of the branch of the Himalaya which extends through nearly the whole length of the Indo-Chinese peninsula; and that near the western coast is an isolated chain called by the natives Sompur Arolen. The centre of the great plain thus enclosed, inundated by the Mekong every year between the months of September and November, and enjoying a most favorable climate, has a soil so productive as to require little tillage, and grain of all kinds, but especially rice, sown without the least preparation of the ground, grows without care or cultivation. The district produces in great



Cambodians.

abundance almost every kind of tropical fruit; palm, banana, orange, citron, olive, mulberry, almond, and fig trees are found in all parts of the plain; the cotton plant and sugar cane are largely cultivated; and tobacco, pepper, and betel form important products. Various dye-woods, as well as ironwood, teak, rosewood, &c., are found on the lower spurs of the mountains, and are among the chief articles of export. Among the animals of Cambodia are the elephant, tiger, rhinoceros, tapir, and the smaller animals common to most parts of southern Asia. The elephant is domesticated here, as in Hindostan and Burmah. Although not especially rich in mineral products, the country

produces in moderate quantities gold, silver, lead, antimony, and zinc, as well as precious stones of several kinds.—Like the Anamese, the Cambodians exhibit traits of both the Mongolian and Malay races. They are somewhat below the middle height, active, but rather supple and agile than strong. Their hair is coarse and abundant, but they wear no beards, pulling out the scanty growth which would otherwise cover the chin. They shave a portion of the head, but leave the crown untouched; the men wear the long tuft of hair thus preserved in a knot; the women twist it into two braids. To touch the head of a Cambodian is one of the greatest insults that can be given him; and the national etiquette carries this reverence for the head to the most ridiculous extremes. Not a few ceremonies are connected with the dressing of the tuft or knot; and the first time of cutting the hair of a child, when it has attained the age of 12 or 13 years, is an occasion of peculiar solemnity, and is called the “ceremony of hair-cutting.” The dress of the Cambodians of both sexes consists of a simple tunic of silk or cotton. The habits of the people are simple, and their manners courteous; they are easily pleased, docile, and peaceable. In their reverence for age, their formal etiquette, and many of their ceremonies, they resemble the Chinese. Polygamy, which is customary among them, is also regulated here as it is in China, the first wife holding a position superior to that of the others, and her children being the legal heirs. One of the singular customs peculiar to Cambodia is that when a woman is delivered of a child she is placed before a hot fire, and is obliged to remain for several weeks with her back exposed to its heat. Physicians receive no pay unless a cure is effected. Slavery exists throughout the country, nearly one third of the population being slaves—either prisoners of war who are kept in this condition, or persons who have sold themselves or have been sold by their parents. These slaves are seldom ill-treated, and can buy their freedom for a sum fixed by the authorities. The houses of the people are raised upon bamboos above the point reached by the waters of the Mekong during the inundations. They are thatched with palm leaves, and are generally neatly kept and comfortable.—The government of Cambodia is an absolute monarchy. The country is divided into provinces governed by mandarins, appointed by the king, and under the immediate supervision of the premier or “superintending minister” (*ordon*). The judicial system is better regulated than in any of the neighboring kingdoms. There are lower and appellate courts, and magistrates corresponding to the police justices of western countries, who make preliminary examinations, have jurisdiction in case of slight offences, &c. An appeal to the king is allowed the poorest subject, and one day in each week is given at the palace to the consideration of such petitions. The capital,

Panomping or Namwang, a town of about 50,000 inhabitants, on the Cambodia river, is the seat of all the chief courts and offices of government. Decapitation for grave offences, imprisonment and fines for lesser crimes, and confinement at hard labor for debt, are among the punishments allowed by law; but torture is rarely employed. The revenues of the kingdom are chiefly derived from land taxes, customs dues, taxes on junks and boats, and monopolies in the hands of the government. Mexican piastres brought from China, Cambodian coins of similar size and value, masses of silver valued by weight, and small zinc coins pierced like the Chinese cash, form the currency.—The kingdom of Cambodia, which included until the latter part of the 17th century the region now known as Cochin China, is first mentioned in Chinese works as the country called Tchila, which about A. D. 616 became tributary to China, and formed a dependency of Tonquin, then subject to Chinese rule. In 625, however, Tchila regained its independence, and by 1016 it had become so powerful that in that year the emperor of China applied to its king for help against Tonquin, which had itself rebelled. Soon after this, according to the Chinese chronicler, the people began to call their country Kamphoutchi, from which name the Kambodia of the early Portuguese explorers, and the modern Cambodia, are evidently derived, though the native name is now Sroc Khmer (the country of the Khmer). The Siamese accounts of Cambodia's early history differ from the Chinese, and the whole subject is involved in great obscurity. Toward the end of the 17th century the country was overrun and conquered by the Anamese, and it was at this time that the emperor of Anam set apart a portion of the south of Cambodia for the settlement of the Chinese who had fled from their own homes for political reasons, and were so numerous and turbulent as to cause great anxiety to the Anamese government. Thus the country was divided into the two parts which have ever since been more or less distinct—that now called Cambodia, and the modern Lower Cochin China. Aided by Anamese settlers, the new inhabitants maintained their position and kept the Cambodians proper in the north. In 1787 the king of Cochin China, Gya-Long, was dethroned by a revolution, and through French missionaries who were in the country, and had converted him to Christianity when very young, applied for help to the court of France. Though the French revolution prevented the execution of a treaty made at Versailles with Gya-Long's emissaries, several French officers entered his service, and with their aid he not only recovered his kingdom, but possessed himself of all Cambodia and the Anamese territory, and established the government of the whole under the name of the empire of Anam. He reigned with skill, and favored Christianity in his dominions, allowing the French missionaries many privileges.

Under his successors, however, this state of affairs was changed, and persecutions and quarrels with France followed, leading to that series of events which ended in 1862 with the subjection of Cochin China by the French. (See COCHIN CHINA.) During the decade preceding the French conquest, Cambodia had been several times compelled to seek help from Siam against its other neighbors; and the Siamese government had indemnified itself by taking possession of several northern provinces of the country. When, in 1860, Norodom, the rightful heir to the Cambodian throne, had been duly crowned, but almost immediately dethroned by a party headed by his younger brother, he increased the obligation by again demanding Siamese aid in recovering his power. This help he could only obtain on such conditions as reduced his kingdom to a mere dependency of Siam; but he accepted them, and was restored to a nominally independent throne. The uncertain position thus given to Cambodia seemed to make its possession a special object of intrigue for the English and French in the East. The king, galled by his relation to Siam, was willing to accept almost any conditions which would free him from the Siamese rule, and both the European nations showed evidence of wishing to take advantage of this disposition. France obtained the opportunity through its conquest of Cochin China, and after some negotiation a French protectorate was established over Cambodia on Aug. 11, 1863. For an account of the reasons given by France for this step, see an article by one of the French diplomatists concerned, in the *Revue des deux Mondes* for February, 1869, entitled *Le royaume du Cambodge et l'établissement du protectorat français*. See "Travels in Indo-China and the Chinese Empire," from the French of Louis de Carné (London, 1872).

CAMBODIA RIVER. See MEKONG.

CAMBON, Joseph, a French revolutionist, born at Montpellier, June 17, 1754, died in Brussels, Feb. 15, 1820. He was engaged in commercial pursuits when the revolution broke out. Upon the flight of Louis XVI. in 1791, Cambon caused the republic to be proclaimed in Montpellier. In September he was sent to the legislative assembly, promoted the confiscation of the estates of the *émigrés* in 1792, and made after Aug. 10 a report in which he argued that Louis XVI., having held a secret correspondence with the enemies of France, was guilty of high treason. He presided over the last sittings of the legislative assembly, and afterward took his seat as a member of the convention, where he voted for the immediate death of Louis XVI. and against the appeal to the people. He opposed the creation of the revolutionary tribunal, and insisted upon trial by jury. At the opening of the convention he had been appointed member of the committee on finances; on April 7, 1793, he entered the committee of public safety. On June 2, when the Girondists were threatened by the mob, he endeav-

ored to save them from violence, and opposed to the last the decree ordering their arrest. In 1794 he made a report on the administration of finances, which gives a full sketch of the plan afterward adopted for the registration of public debt. In the revolution of the 9th Thermidor Cambon took part against Robespierre; but he was charged with having been his accomplice, and a warrant was issued against him. He succeeded in baffling the search for him, and finally retired to a farm in the vicinity of Montpellier. On the second return of the Bourbons he was not included in the bill of amnesty, and repaired to Brussels, where he spent his last years.

CAMBORNE, a market town and parish of Cornwall, England, 12 m. W. N. W. of Falmouth; pop. in 1871, 7,298. It is a neatly built modern town, and derives its importance mainly from its vicinity to very productive tin and copper mines. It has a handsome granite church, built in the later Gothic style, several dissenting chapels, and a free school.

CAMBRAI, or **Cambrai**, a fortified city of France, department of Le Nord, on the right bank of the Scheldt, at the head of the canal of St. Quentin, 105 m. N. E. of Paris; pop. in 1866, 22,207. It was a place of importance when Cæsar conquered the country, and from its old name, Camaracum, its present appellation was derived. The city is entered by four gates. The streets, though wide, are irregular. Many of the houses are very old, and have their gable end toward the street. The place d'armes is of great extent, and the esplanade is one of the finest in French Flanders. The principal public buildings are the cathedral, which is modern, the old one having been destroyed during the revolution, the city hall, and the theatre. Cambrai has a communal college, a diocesan seminary, a library with 50,000 volumes, schools of design, sculpture, painting, and anatomy, and several charitable institutions. There is a monument to Fénelon, archbishop of Cambrai. It has been long celebrated for its manufacture of fine linens and lawns, whence all similar fabrics are called cambrics, and which are still the most important branch of its industry. It also produces thread, cotton, stuffs of various kinds, soap, and beet sugar.—Cambrai was one of the chief towns of the Nervii, and afterward the seat of a small Frankish kingdom, which was united by Clovis to his empire. During the middle ages it belonged to the counts of Flanders, and afterward came into the possession of the dukes of Burgundy, from whom it was transmitted to the house of Austria. It was fortified by Charlemagne, strengthened by Charles V., who erected the citadel, and its fortifications were still further improved by Vauban. Here the famous league against Venice was concluded in 1508, and a peace between Francis I. and Charles V. was negotiated in 1529 by Louise of Savoy and Margaret of Austria, known as *la paix des dames*. It was taken

from the Spaniards by Louis XIV. in 1677, and confirmed to France by the treaty of Nimeguen. It was vainly besieged by the Austrians in 1793, and was captured by the English, June 24, 1815.

CAMBRIA, a S. W. county of Pennsylvania, drained by affluents of the Susquehanna and Alleghany rivers; area, 670 sq. m.; pop. in 1870, 36,569. It consists of an elevated table land with a broken surface. Bituminous coal and iron are abundant. It is crossed by the Pennsylvania Central railroad and the Ebensburg branch. The chief productions in 1870 were 56,988 bushels of wheat, 47,885 of rye, 153,252 of Indian corn, 846,991 of oats, 89,368 of potatoes, 25,801 tons of hay, 428,273 lbs. of butter, and 47,545 of wool. There were 4,519 horses, 6,537 milch cows, 6,142 other cattle, 16,889 sheep, and 7,486 swine. Capital, Ebensburg.

CAMBRIAN SYSTEM, a group of fossiliferous rocks which underlies and is older than the Llandeilo or lowest Silurian strata, and rests immediately upon the abnormal masses of gneiss and other rocks which contain no organic remains. The name was applied by Prof. Sedgwick, by whom the system was first described, on account of its extensive development in northern Wales, Cambria being the Latin name of that country. The characteristic rocks are gritstones, sandstones, clay slate, &c., containing few organic remains; and in some localities they appear metamorphosed into chloride and mica schists, and into gneiss. The oldest fossils of Europe have been found in this system, but the oldest known organic remains were found in 1864 in the lower Laurentian system of Canada.

CAMBRIDGE, a city, and one of the capitals of Middlesex co., Mass., a suburb of Boston, lying W. of that city, and separated from it by the river Charles, which is nearly a mile wide. It embraces four divisions, known locally as Old Cambridge, North Cambridge, Cambridgeport, and East Cambridge, in each of which there is a post office. The population has increased from 2,115 in 1790 to 15,215 in 1850, 26,060 in 1860, and 39,634 in 1870. Of the population in 1870, 27,579 were of native and 12,055 of foreign birth; 88,785 were white and 848 colored. There were 7,897 families, occupying 8,384 dwellings. The city covers an extensive area, generally level, and is laid out in broad streets and avenues, lined with elms and other shade trees. Conspicuous among these is the Washington elm, beneath which Washington assumed the command of the American army in 1775. The tree is probably of the native forest growth, and is still vigorous. Many of the private residences are surrounded with highly cultivated grounds, lawns, flower gardens, and orchards. Many structures erected before the revolution are still standing, among others the house used by Washington for his headquarters, now inhabited by the poet Longfellow. Cambridge is

chiefly noted as being the seat of Harvard university, the oldest and most richly endowed institution for instruction in America. (See HARVARD UNIVERSITY.) The college



Washington Elm.

grounds are in Old Cambridge, about 8 m. from Boston, and embrace about 14 acres, laid out with much taste, and shaded with elms of great size and age. Connected with the university are Agassiz's museum, a short distance N. E. of the college; the botanical garden, about three fourths of a mile N. W. of the college, and near it the observatory, containing one of the most valuable telescopes in the United States; also, the divinity school, near



Longfellow's House.

the museum, the Lawrence scientific school, and the Harvard law school. Memorial hall, erected to the memory of the students who lost their lives in the civil war, is a large and hand-

some building in the immediate vicinity of the college, and will be used for the meetings of the alumni. A granite monument has recently been erected by the city on the common near the college grounds in honor of the soldiers who fell in the civil war.—The cemetery of Mount Auburn, noted as the burial place of many distinguished persons, is in Cambridge and Watertown. It includes 125 acres of land covered with a vigorous growth of forest trees. The tract is undulating, with bold eminences and beautiful dells. The highest eminence is 125 ft. above the tide in the river Charles, which winds along at a short distance from its base. A round tower of hammered granite, with a lookout 70 ft. from the ground, has been erected upon its summit. The grounds are laid out with curved avenues adapted to the inequalities of the surface. The walks are smoothly gravelled and bordered with ornamental shrubs and flowers. The burial lots contain about 300 sq. ft. each, and on many of them are monuments of rare workmanship and elaborate design. The entrance is through a gateway of granite, in the Egyptian style of architecture. Among the monuments is one to Spurzheim, the phrenologist, of Italian marble, and after the design of Scipio's tomb at Rome. The cemetery was dedicated in 1831.—Cambridge is connected with Boston by two bridges, and with Charlestown, Brookline, and Brighton by separate bridges across Charles river. The Boston and Lowell and the Fitchburg railroads pass through East Cambridge, and several horse railroads connect the city with Boston and the adjoining towns. The streets are lighted with gas, well supplied with sewers, and some of them are paved. There is little business activity in Old Cambridge and North Cambridge, the population consisting largely of persons engaged in business in Boston, of retired merchants, and especially of literary and scientific men, many of whom reside here. There are, however, an extensive bookbindery and several printing offices widely known for the excellence of their work. Among these are the Riverside press and the University printing office; the latter is the oldest printing establishment in the United States, having been founded in 1639. At Cambridgeport is a noted telescope manufactory, where the largest and best astronomical instruments in the United States have been made. The principal manufacturing establishments of Cambridge are 4 of locomotives, steam engines, and boilers, 2 of glass, 3 of chemicals, 3 of brushes, 5 of carriages, 8 of marble and stone, 3 of sperm and tallow candles, 16 of soap, 1 of chairs and sofas, 6 of cabinet ware, 1 of gas, 5 of ice, 1 of diaries, 1 of army bedsteads, 2 bacon works, 3 iron foundries, 2 machine shops, 2 brick yards, 8 tanning and currying establishments, 6 printing establishments, 3 bookbinderies, 3 brass foundries, and a manufactory of gas oil, and kerosene fixtures and lamps. In 1870 there were 6 national banks, with a capital of

\$750,000, and 4 savings banks. The government is vested in a mayor, a board of 10 aldermen, 2 from each ward, and a common council of 20 members, all of whom are elected annually on the first Monday in December, and enter upon their official duties the first Monday in January. The city hall is in Cambridgeport, and the court house and jail are in East Cambridge. The police department comprises a police justice, two special justices, and a chief of police, with a force of 46 members. The fire department comprises 84 members under a chief and 4 assistant engineers, 4 steam fire engines, one hook and ladder truck, 8,000 ft. of hose, and a fire-alarm telegraph. The city is supplied with water from Fresh, Spy, and Little ponds, whence it is brought to two reservoirs for distribution. The total cost of the water works to Dec. 1, 1872, was \$1,030,384. The debt of the city, Dec. 1, 1872, was \$2,185,843. The total expenditures for 1872 amounted to \$1,284,314. The total valuation of property amounted to \$21,527,100 in 1862, \$28,385,700 in 1866, and \$48,609,000 in 1871. The total tax, including state, county, and city, in 1871, was \$748,862. The public schools are of a high order, and are classified as primary and grammar schools and a high school. In the last named, which ranks among the best in New England, students are prepared for college. In 1872 there were 35 public schools, including 7 evening schools. The number of school houses was 27. There were 7,000 pupils and 165 teachers, of whom 145 were females. In the high school were 300 pupils and 9 instructors. The total expenditures for school purposes during the year amounted to \$235,000. Besides the public schools, there were 20 private schools with 630 pupils. The principal public library is the Dana library at Cambridgeport, containing 5,500 volumes. A course of free lectures is given annually by the Dowse institute, supported by a bequest of \$10,000 by Thomas Dowse. Two weekly newspapers and one bi-weekly are published in the city. There are 27 churches, viz.: 5 Baptist, 5 Congregational (Trinitarian), 4 Congregational (Unitarian), 4 Episcopal, 3 Methodist, 3 Roman Catholic, and 3 Universalist.—Cambridge was settled in 1630, at first under the name of Newtown, by Gov. Winthrop and other prominent men, who designed to make it the chief town in Massachusetts colony. The annual election for governor was for several years held under an oak tree on the common. The Rev. Mr. Hooker and the Rev. Mr. Stone, graduates of Cambridge university, England, were the first settled ministers of the place, both of whom subsequently accompanied the Connecticut settlers in their journey through the wilderness, and founded Hartford. Mr. Hooker was settled in 1632, and soon had for parishioners the learned men of the colony, most of whom had graduated at Cambridge. In 1636 the general court appropriated £400 for the establishment of a public school at New-

town, which in 1638 was further endowed by the Rev. John Harvard, minister of Charlestown. In honor of the place where the chief men of the colony had received their education, the name of the town was changed to Cambridge, and the school was styled Harvard college. During the war of the revolution, the American army occupied Cambridge while the British were in possession of Boston. The city was incorporated in 1846.

CAMBRIDGE, the county town of Cambridgeshire, England, and seat of a famous university, situated on the river Cam, 49 m. N. of London; pop. in 1871, 80,074. The town is in the centre of an agricultural district, and has an excellent market. The principal buildings besides the colleges are the guildhall, a handsome modern structure; several churches, including St. Sepulchre, built in imitation of the church of the Holy Sepulchre at Jerusalem, and consecrated in 1101; and Addenbrooke's hospital. A school of art was



Church of St. Sepulchre.

established here in August, 1858. King John gave Cambridge a guild, and the privilege of being governed by a provost of its own choosing, an office for which Henry III. substituted a mayor and four bailiffs. The borough of Cambridge is governed by 10 aldermen and 30 councillors, one of whom is mayor, and it returns two members to the house of commons, besides the two sent by the university. There are places of worship for Wesleyans and Primitive Methodists, for Baptists and Independents; a free grammar school for 100 scholars; and various charitable, educational, and literary institutions, including an industrial school, a mechanics' institute, and the Philo union.

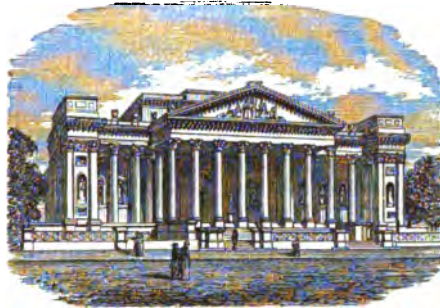
CAMBRIDGE, University of, an English seat of learning, of very ancient origin. It is probable that it was a place of resort for students as early as the 7th century. The date of its incorporation as a university is 15 Henry III. (1231), and it received its first formal charter

of privileges from Edward I. (1291). Fuller charters were granted in the reigns of Edward II., Edward III., Richard II., and Henry IV.; and more ample privileges were given by Henry V., Edward IV., and Henry VII. Elizabeth granted an enlarged charter in 1562, and parliament in 1572 confirmed this and all preceding grants, with an act of incorporation under the name of the "chancellor, masters, and scholars of the university of Cambridge." Queen Victoria confirmed the charter and privileges by order in council, July 31, 1858. The university consists of the following 17 colleges: St. Peter's, founded by Hugh de Balsham, bishop of Ely, in 1257; Clare Hall, by Elizabeth de Burgo, countess of Clare, in 1326; Pembroke Hall, by the countess of Pembroke in 1347; Gonville and Caius, by Edmund Gonville in 1348, increased by John Caius in 1558; Trinity Hall, by W. Bateman in 1350; Corpus Christi, by two Cambridge guilds in 1352; King's, by Henry VI. in 1441; Queens', by Margaret of Anjou in 1448, refounded by Elizabeth Widville in 1465; St. Catherine's, by Robert Woodlark in 1473; Jesus, by John Alcock, bishop of Ely, in 1496; Christ's, by Henry VI. in 1456, refounded by the countess of Richmond and Derby in 1505; St. John's, by the countess of Richmond and Derby in 1511; Magdalene, by Baron Audley in 1519; Trinity, by Henry VIII. in 1546; Emmanuel, by Sir Walter Mildmay in 1584; Sidney Sussex, by the countess of Sussex in 1598; Downing, by Sir George Downing in 1800. Each college is a corporate body, bound by its own statutes, but is likewise subject to the general laws of the university. Each of the 17 colleges furnishes members both for the legislative and executive branches of the government of the university. The former branch consists of a senate, which is divided into two houses, the regents' and the non-regents' house, and of the council of the senate, by which every university grace must be sanctioned before it can be brought before the senate. No degree is ever conferred without a grace for that purpose. The council consists of the chancellor, the vice-chancellors, four heads of colleges, four professors of the university, and eight other members of the senate. The executive officers of the university are a chancellor, a vice-chancellor, a high steward, a commissary, the assessor, two proctors, a librarian, a registrar, two moderators, syndics, or officers appointed for special cases, two pro-proctors, three esquire bedels, and various inferior officers. The university sends to the house of commons two members, who are chosen by the collective body of the senate. The public professors are: the Lady Margaret's professor of divinity; the regius professors of divinity, civil law, physic, modern history, Hebrew, Greek; a professor of Arabic, and a reader who is appointed by the lord almoner; the Lucasian professor of mathematics; professors of moral philosophy or casuistry, chemistry, anatomy, botany, and

geology; the Plumian professor of astronomy and experimental philosophy; the Lowndean professor of astronomy and geometry; the Norrisian professor of divinity; the Jacksonian professor of natural and experimental philosophy; the Downing professors of the laws of England and of medicine; the professors of mineralogy, political economy, and music; and the Disney professors of aridology, founded in 1831 by John Disney. Besides these regular professorships, there are various endowed lectureships. A board of mathematical studies was established in 1848, a board of classical studies in 1854, and a board of medical studies in the same year. The revenues of the separate colleges are large, and are derived from endowments and fees; but those of the university are small, and hardly exceed £5,500 a year. The public income of the university is chiefly from the proceeds of the rectory of Burwell, from matriculation and other fees, and from the profits of the Pitt or university press. The professors are paid from the university funds, or by the government, or from estates left for that purpose. The senate appoints some of the professors, the crown others, and still others are elected by special bodies. The mode of admission on the boards of a college is either by examination, or more usually through a graduate's recommendatory certificate, accompanied by a deposit, called caution money. The students are divided into four classes: noblemen, who pay £50 caution money; fellow commoners, who pay £25, and who receive their name from their privilege of dining (having their "commons") at the table of the fellows; pensioners, who pay £15, and form the great body of the students not on the foundation; and sizars, who pay but £10, and are students whose poverty prevents their taking advantage of many of the privileges of the university, though they are not shut out from any of its educational facilities. The sizars were once obliged to perform the most menial offices, but for many years this custom has been abolished. The matriculation fees for these classes of students are respectively £16, £11, £5 10s., and £1 5s. There are various degrees of payment for tuition, according to the degree and condition of the members, and slightly differing in the several colleges. The annual unavoidable average expenses of an undergraduate or student are about £70. The terms of the university are three, viz.: Michaelmas or October, begins Oct. 1, and ends Dec. 10; Lent, or January, begins Jan. 13, and ends on the Friday before Palm Sunday; Easter, or midsummer, begins on the Friday after Easter day, and ends on the Friday after commencement day, which is always the first Tuesday in July. The degrees conferred by the university are those of bachelor of arts, master of arts, bachelor and doctor in divinity, bachelor and doctor of laws, bachelor and doctor in physic, and bachelor and doctor in music. For the requirements in taking these degrees, see Uni-

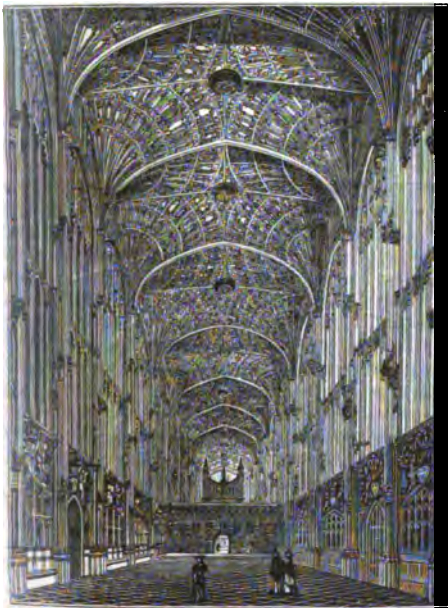
VERSITY. The examinations take place in the Lent term in each year, are conducted by the moderators and by examiners appointed by the senate, and the course of study preparatory to the degree of B. A. comprises the principal branches of learning. The first university or "previous" examination, technically called the "little go," takes place in the Lent term of the second year from that in which the student commences his academical residence, the subjects of examination being one of the four Gospels or the Acts of the Apostles in the original Greek, Paley's "Evidences of Christianity," and one each of the Greek and of the Latin classics. The examination of bachelors of arts extends over 22 days; that of candidates for mathematical honors, technically called the mathematical tripos, lasts eight, and that in classical learning, or the classical tripos, five days. Examinations in moral and natural sciences (moral sciences and natural sciences tripos) have likewise been in operation since 1857. At the close of the examination, a select number, 80 at least, are recommended to the approbation of the proctors, and their names are classed in three divisions, viz.: wranglers, senior optimes, and junior optimes, the highest of all being the senior wrangler for the year. The candidates are then admitted to their degrees by the vice chancellor, after they have taken the oath of allegiance and supremacy, and of observing

tenable for life, but in most cases conditioned upon taking holy orders within a limited period. Their value varies from £100 to £300 per annum. There are also salaries attached to the offices of dean, bursar, steward, &c.; and there



Fitzwilliam Museum.

are prizes, medals, and scholarships of different values. Since the days of Newton, Cambridge has been considered more particularly the chosen seat of mathematical science, but the tendency to make it a stronghold of learning in all the various branches of science has been increasing of late years. Among the eminent men who have studied at Cambridge are Chaucer, Bacon, Coke, Harvey, Spenser, Ben Jonson, Milton, Dryden, Newton, Pitt, and Byron. Among the famous teachers have been Archbishop Whitgift, Bishop Wilkins, Isaac Barrow, and Richard Bentley.—Many of the principal buildings and offices of the various colleges are of remarkable beauty, and above all the Gothic chapel of King's college. The public buildings of the university consist of the senate house, the university library, the schools, the university or Pitt press, the observatory, the botanical garden, the anatomical, geological, and mineralogical museums, and the celebrated Fitzwilliam museum, for the establishment of which Lord Fitzwilliam bequeathed to the university the annual interest of £100,000 South sea annuities, and which contains a collection of books, paintings, and engravings. The university library has greatly increased, mainly through the munificence of George I. and II., and the number of printed volumes is now about 280,000. There are also about 8,000 manuscripts, which contain many remarkable works. By the copyright act it is entitled to a copy of every volume, map, and print published in the United Kingdom. The library of Trinity college contains nearly 50,000 volumes, including MSS. in the handwriting of Milton, Newton's copy of his *Principia*, and Dr. Gale's Arabic manuscripts; an addition of 4,800 volumes by a bequest of Archdeacon Hare is especially rich in German literature. The library of Corpus Christi college, St. John's college library, and the Pepysian library (so called after Samuel Pepys) also contain many ancient manuscripts



Gothic Chapel in King's College.

the statutes of the university, and having also declared that they are *bona fide* members of the church of England. There are 480 fellowships,

and curious books. There are also in the university a hospital founded by the will of Dr. Addenbrooke in 1753, and three learned associations, viz.: a philosophical, an antiquarian, and an architectural society.—See "Five Years in an English University," by C. A. Brister (New York, 1852; new ed., 1872), and "Lectures on the University of Cambridge, England," by W. Everett (Cambridge, Mass., 1865).

CAMBRIDGE, Dukes of. **I. Adolphus Frederick**, born in London, Feb. 25, 1774, died July 8, 1850. He was the youngest son of George III., and the uncle of Queen Victoria. He entered the British army as ensign when 16 years of age, afterward completed his education at the university of Göttingen, and returned to England in 1793. He leaned at first to the side of the opposition on the question of the French war, but afterward sided with the government. He took part in the campaign in the Netherlands in 1793, and fell into the hands of the French at the battle of Hondschoote, but was soon afterward exchanged. In 1801-'3 he was employed in Hanover, vainly endeavoring to preserve it from foreign occupation. In 1816 he was again sent to Hanover by the prince regent as governor general, and in 1831 was appointed viceroy of Hanover. In 1837, on the separation of Hanover from the British crown, he returned to England. From that period he was chiefly known as the president of charitable societies, and chairman at anniversary dinners. **II. George William Frederick Charles**, son of the preceding, and cousin of Queen Victoria, born in Hanover, March 26, 1819. He became colonel in the army in 1837, and major general in 1845. In 1850 he succeeded his father as duke of Cambridge, in 1854 was advanced to the rank of lieutenant general, and in 1856 to that of general. He commanded the two brigades of Highlanders and guards which formed the first division of the army sent to the Crimea. He led these troops into action at the battle of the Alma, and at Inkerman had a horse shot under him. Directed by his physician to withdraw for a time from camp life, he retired first to Pera, and soon afterward to England. In July, 1856, he was appointed commander-in-chief of the British army, and on Nov. 9, 1862, field marshal. He has been living so many years with Miss Fairbrother, who was in her youth an actress of celebrated beauty, that she is generally regarded as his wife, though they have never been married, and she does not inhabit his official residence. She has borne him many children, who are called after their father Fitz-George. Some of the sons are in the army.—His sister **AUGUSTA**, born July 19, 1822, married on June 28, 1843, the grand duke Frederick William of Mecklenburg-Strelitz; and his sister **MARY**, born Nov. 27, 1833, and very popular in London society, married, July 12, 1866, Count Francis Hohenstein, son of Duke Alexander of Württemberg by a morganatic marriage with the countess Hohenstein, upon whom the title

of Prince Teck was conferred by the king of Württemberg in 1863, and of duke in 1871.

CAMBRIDGESHIRE, an E. county of England, bordering on the counties of Lincoln, Norfolk, Suffolk, Essex, Hertford, Bedford, Huntingdon, and Northampton; area, 893 sq. m.; pop. in 1871, 186,368. About three fourths of the county consists of arable land, meadow, and pasture, the remainder being fens. The upper greensands, which crop out near the surface in some places, furnish an abundance of the fossils called coprolites, which are of great value as manure. In the higher parts the land produces fine crops of beans and wheat; cattle and sheep thrive on the thin chalky soils, and on the fens; the fens also, when drained, produce abundant crops. The general aspect of the county is flat; in fact, it has been redeemed for agricultural purposes and includes part of the great Bedford level. The rivers are the Ouse, the Nene, the Lark, and the Cam, all small, but rendered useful for inland navigation. The county is traversed by several railways and main roads, but the internal traffic is inconsiderable. Capital, Cambridge.—The early history of Cambridgeshire is interesting for the resistance offered by the Saxons in the tale of Ely to the Normans. They succeeded for a considerable time in maintaining their independence against William the Conqueror. In the civil wars Cambridgeshire was favorable to the parliament while the university supported the king.

CAMBRONNE, Pierre Jacques Edouard, baron, a French general, born at St. Sébastien, near Nantes, Dec. 26, 1770, died in Nantes, Jan. 5, 1842. He served in La Vendée under Hoche, then in Switzerland under Masséna, entered the imperial guard, and was renowned for intrepidity. When the emperor was sent to Elba, Cambronne went with him, and during the hundred days he received the rank of lieutenant general and a seat in the senate. At Waterloo he was in command of the imperial guard; and when the day was lost, being surrounded by his enemies and summoned to surrender, he refused, and fell covered with wounds. He was taken from among the dead, nearly dead himself, carried to Brussels, and afterward to London; but having been charged in France as guilty of an attack on his own country, he gave himself up as a prisoner and demanded a trial. He was tried and honorably discharged. After the revolution of July, 1830, although almost disabled by age and wounds, he was reinstated among the staff officers of the army.

CAMBYSES, the second Persian king, succeeded his father Cyrus in 529 B. C., and died in 522. He is probably the Ahasuerus mentioned in Ezra iv. 6-22 as prohibiting the Jews from rebuilding their temple. He completed the annexations of his father in western Asia, and in 525 conquered Egypt, taking its king Psammenitus captive. He then desired to attack Carthage; but the Phœnician fleet

which formed the bulk of his navy, refused to molest their own colony. An army sent to take possession of the temple of Jupiter Ammon perished in the sand, and another army, led by Cambyzes himself against the Ethiopians, was reduced by hunger and disease. These disasters seem to have deprived Cambyzes of his senses, and his subsequent conduct was that of a madman. He put his brother Smerdis to death, killed one of his sisters, who was (contrary to Persian law) also his wife, because she mourned for Smerdis, and treated the Egyptians with great cruelty. He gave orders for the destruction of many Egyptian sacred monuments, and slew the god Apis. He ordered Croesus, the ex-monarch of Lydia, to be put to death, and repented immediately that he had done so; but on finding that his officers had saved Croesus, he ordered them to execution for disobedience, though he took the Lydian again into favor. His eccentricities and long stay in Egypt brought about a revolution in Persia, where Gomates, a Magnus, personated Smerdis, and was acknowledged as king. Cambyzes received the news in Syria, and was preparing to subdue the impostor, who was supported by the adherents of the Magian religion, when he died, according to Herodotus, from a wound accidentally inflicted by his own sword.

CAMDEN, the name of four counties in the United States. **I.** A S. W. county of New Jersey, separated from Pennsylvania by the Delaware river; area, 220 sq. m.; pop. in 1870, 46,193. The surface is generally level, the soil of the E. part sandy, and that of the W. a rich loam, yielding quantities of fruit and vegetables for the Philadelphia markets. It is traversed by the Camden and Amboy, Camden and Atlantic, Camden and Burlington County, West Jersey and Vineland railroads, and a branch of the New Jersey Southern railroad. The chief productions in 1870 were 85,284 bushels of wheat, 27,036 of rye, 320,774 of Indian corn, 376,369 of Irish and 113,528 of sweet potatoes, 16,389 tons of hay, and 206,775 lbs. of butter. There were 2,338 horses, 4,555 milch cows, 1,174 other cattle, 990 sheep, and 6,875 swine. Capital, Camden. **II.** A N. E. county of North Carolina, bounded N. by Virginia, S. and S. W. by Albemarle sound and Pasquotank river; area, 280 sq. m., part of which is occupied by the Dismal Swamp; pop. in 1870, 5,861, of whom 2,121 were colored. It has a level surface and a fertile soil. Valuable forests of cedar and cypress exist, and the exportation of the timber and other products is facilitated by the Dismal Swamp canal, 22 m. long. The chief productions in 1870 were 2,823 bushels of wheat, 329,660 of Indian corn, 10,430 of oats, 24,655 of sweet potatoes, and 58 bales of cotton. There were 576 horses, 828 milch cows, 1,496 other cattle, 1,075 sheep, and 7,300 swine. Capital, Camden Court House. **III.** A S. E. county of Georgia, bordering on Florida and the Atlantic, bounded S. by St. Mary's river, W. partly by the Santilla, and N. by the Little

Santilla; area, 600 sq. m.; pop. in 1870, 4,615, of whom 8,157 were colored. It includes Cumberland island in the Atlantic, 18 m. long, 2 or 3 m. wide, and separated from the mainland by a narrow channel. The surface is level and the soil sandy. The chief productions in 1870 were 28,552 bushels of Indian corn, 19,187 of sweet potatoes, 145 bales of cotton, and 2,877,020 lbs. of rice. There were 226 horses, 2,073 milch cows, 4,682 other cattle, and 3,585 swine. Capital, Jeffersonton. **IV.** A central county of Missouri, drained by the Osage and several other rivers; area, 600 sq. m.; pop. in 1870, 6,108, of whom 149 were colored. The surface is undulating, and the soil tolerably fertile. Lead mines are worked near Osage river, which is navigable during a short time every year. The Atlantic and Pacific railroad touches the S. E. border. The chief productions in 1870 were 48,010 bushels of wheat, 181,288 of Indian corn, 23,415 of oats, and 25,507 lbs. of tobacco. There were 2,030 horses, 1,544 milch cows, 2,985 other cattle, 6,874 sheep, and 9,916 swine. Capital, Linn Creek.

CAMDEN. **I.** A city and the capital of Camden county, N. J.; pop. in 1870, 20,045. It is built on a plain on the left bank of the Delaware, immediately opposite the city of Philadelphia, with which it is connected by four ferries. The streets are regular, and intersect one another at right angles. There are many fine buildings; the principal public edifices are a court house and jail, and the railroad depots. There are several iron foundries, chemical and glass works, and some other manufactories. In 1871 there were 12 public schools with 8 male and 59 female teachers, and 1,450 male and 1,550 female pupils. There are three weekly newspapers. The city was chartered in 1831. It is the terminus of the Camden and Amboy, the West Jersey, and the Camden and Atlantic railroads. **II.** The capital of Kershaw county, S. C., 102 m. N. N. W. of Charleston; pop. in 1870, 1,007, of whom 555 were colored. It is situated in a fertile and productive region, on the E. bank of the Wateree river, which is navigable to this point by steamboats, and is crossed by a bridge near the town. It is the terminus of the Camden branch of the South Carolina railroad, and contains an arsenal, academy, factory, bank, 4 churches, and a weekly newspaper. A battle was fought here, Aug. 16, 1780, between Gates and Cornwallis, in which the former was routed and De Kalb mortally wounded; and another, known as the engagement of Hobkirk's Hill, April 25, 1781, between Greene and Rawdon, the latter of whom kept the field. A monument to De Kalb was erected in 1825, of which Lafayette laid the corner stone. Two Indian mounds exist near the town. **III.** The capital of Wilcox county, Ala., 88 m. S. W. of Selma; pop. in 1870, 3,060, of whom 2,225 were colored. It stands on a healthy eminence, about 4 m. from the Alabama river, and

is the centre of an active trade. A weekly newspaper is published here. IV. The capital of Washita county, Ark., 82 m. S. S. W. of Little Rock; pop. in 1870, 1,612, of whom 612 were colored. It stands on a declivity of a range of hills, on the right bank of the Washita river, at the head of navigation for large steamers, and possesses great advantages for trade. It was formerly a rendezvous for hunters, known as *Écore à Fabre*. It was settled in 1842, on the site of a dense forest. One daily and three weekly newspapers are published here.

CAMDEN, a S. E. county of New South Wales, Australia, bounded E. by the Pacific, N. and W. by the Wollondilly river, and S. by the Shoalhaven river; area, 2,200 sq. m.; pop. in 1866, 22,734, since when it has largely increased. The soil is well watered and fertile, and it is the largest grain-producing county in the colony. It contains the cow pastures, so called from large herds of cattle found there which sprung from a few animals that escaped from the settlement soon after the foundation of the colony. Near Wollongong are the celebrated Fitzroy iron mines. Capital, Berrima.

CAMDEN, Charles Pratt, earl, an English statesman, born in Devonshire in 1714, died in London, April 18, 1794. He was educated at Eton and Cambridge, and was called to the bar in 1738, where, after passing a long period without practice, his rise was sudden and rapid. In 1752, upon the prosecution of a printer for a libel upon the house of commons, Pratt maintained, in opposition to the ruling of the judge, the doctrine of the right of juries to decide upon the nature and intention of alleged libels. His position upon this occasion was the commencement of a contest which continued for 40 years, until his doctrine was finally established as law. In 1757 he was made attorney general and knighted. Upon the accession of George III. he was appointed chief justice of the court of common pleas, and accepted the appointment as a retirement from public life. But the arrest of John Wilkes, April 30, 1768, under a general warrant from the secretary of state and other similar cases, brought the political and legal questions concerning the legality of such warrants before that court, and he was called upon to take a position in defence of the liberties of the subject. The principles which he then laid down have ever since been considered of the first importance. He was raised to the peerage, July 17, 1765, under the name of Baron Camden. He distinguished himself by his exertions in behalf of the American colonies, and on the formation of Lord Chatham's second administration he was made lord chancellor, July 30, 1766. He held this office for 3½ years, with universal approbation, but occupied as a minister a doubtful position in relation to the American policy of the cabinet. Upon the resignation of Lord Chatham he was removed from his place, Jan. 17, 1770. From this time

until the close of the American war he continued in opposition to the government of Lord North, and distinguished himself by the eloquence with which he contended in parliament for the rights of the Americans. After the resignation of Lord North's ministry in 1782, he was made president of the council, but resigned the next year on the accession of the "coalition ministry," and enlisted under the banner of the younger Pitt. The success of Pitt led to Camden's restoration to the same office, which he filled for nine years. On May 18, 1786, he was created Earl Camden and Viscount Bayham of Bayham Abbey, Sussex, and still took a considerable share in the business of the house of lords, notwithstanding his advanced age. In 1792, a short time before his death, he pressed the passage of Mr. Fox's declaratory libel bill through the house of lords, against the opposition of Lord Thurlow, who had procured a unanimous opinion of the 12 judges against it; and its final success was mainly attributable to his courage and vigor.

CAMDEN, William, a British historian and antiquary, born in London, May 2, 1551, died at Chiselhurst, Kent, Nov. 9, 1623. In 1571 he left the university of Oxford, having previously been educated at Christ's hospital and St. Paul's school, and in 1575 was appointed second master of Westminster school. In the following year he composed his celebrated descriptive work *Britannia*, written in elegant Latin, which was published in 1586, and passed through eight editions in four years. An English translation, by Dr. Holland, appeared in 1610, and a later edition in 1687, and a new translation by Edmund Gibson, afterward bishop of London, in 1695; and an edition enlarged by Richard Gough, the topographer, was published in 1789, in 8 vols. fol., increased to 4 vols. by John Nichols in 1806. In 1592 he became head master of Westminster school, and in 1597 was made Clarencieux king at arms. His next great work was the "Annals of the Reign of Queen Elizabeth," also written in Latin; the first part of this was published in 1615, and though it was completed within the next two years, he determined that the second volume should not appear till after his death. He wrote many other works, among which was a Greek grammar published in 1597. He was interred in Westminster abbey, where a monument with his half-length statue, the left hand resting on "*Britannia*," still remains. He devoted the greater part of his fortune to the foundation of a professorship of history at Oxford, which bears his name. The "Camden Society," for the publication of early historical and literary remains, founded in 1838, was named in his honor.

CAMEL (*camelus*), a genus of ruminating animals, without horns, forming a connecting link between the ruminants and pachyderms. It was one of the earliest animals domesticated by man, and is mentioned by the Hebrew writers long before the horse. It is not known

to exist in a wild state, unless there is reason to believe that it is the progeny of animals, once domesticated, which have been accidentally or purposely liberated. It is now distrib-



Camelus Bactrianus.

uted over Arabia, Persia, southern Tartary, some parts of China, India, and northern and northwestern Africa. Some years ago the camel was introduced into the southern United States by the government, for the conveyance of military supplies and provisions to the garrisons in and beyond the great desert and the extensive plains now traversed by the Pacific railroad; an attempt was also made to acclimatize it in Texas; but any satisfactory results which might have been expected from such experiments were frustrated by the civil war. —Zoologically the camel is divided into two species: the Bactrian camel (*C. Bactrianus*),

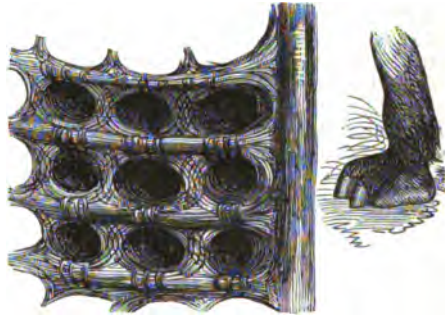


Camelus Arabicus.

with two humps, and the Arabian or one-humped camel (*C. Arabicus*), sometimes but improperly called the dromedary. The true dromedary is merely a variety of the Arabian

camel, to which it bears the same relation that the race horse does to the common horse.

The dental formula is: incisors, $\frac{1-1}{2-2}$; molars, $\frac{6-6}{6-6}$, the anterior ones being conical, separated from the rest, and sometimes regarded as canines. The upper lip is hairy, naked in front, and elongated; neck and legs long; toes two, callous beneath, the hoofs covering only the upper surfaces, the soles not being divided. The upper incisors are conical, compressed, somewhat curved, resembling canines, and are used for tearing up the hard and thorny plants of the desert on which the animal usually feeds. It is a large and ungainly creature, with a hump or humps on the back and callosities on the knees; the hind legs seem disproportionately long, and the croup weak; and it is probably the most awkward-looking of the mammals. Yet its apparent deformities make it one of the most useful of animals, and one without which the desert in semi-barbarous communities would be impassable. Its clumsy-looking and wide-spreading feet prevent it from sinking into the sand, and give its gait an



Cells of the Camel's Stomach.

Foot of Camel.

elasticity and silence peculiar to itself; its long pendulous upper lip is its organ of prehension, and its nostrils can be closed at will against the wind-driven sand. The hump upon its back is a storehouse of food, which is slowly reabsorbed during its long marches, and secures it against death from the unavoidable privations of the desert. The seven rough callosities on the flexures of the limbs and chest are the points on which it rests when it kneels to receive its burden. The first stomach or paunch has a division, which may be closed by muscular action, whose walls are provided with a system of large cells, capable of considerable distention, which the animal can fill with water, to the amount of several quarts, and thus carry with itself a supply for its own wants for about a week, a supply which it occasionally yields with its life to save that of its master. The camel supplies the Arab with milk, and occasionally with its flesh, which is said to resemble beef, for food; the hair serves to make clothing, the skin for leather, and the dung for fuel. The chief value of the camel,

however, is as a beast of burden; its strength, power of endurance, ability to subsist on the coarsest food, to go without water, and to travel over the yielding sand, has justly earned for it the title of "ship of the desert." The ordinary load for a camel is about 600 lbs., though for short journeys it can carry 1,000 lbs.; the speed of the camel is seldom more than 3 miles an hour, and the swiftest dromedaries do not exceed 10, but the pace can be kept up for 20 hours without rest; a lightly loaded camel will take with the same foot about 38 strides a minute, each one averaging 7 feet. Riding on a swift camel is the most terrible way of travelling to the uninitiated, as the peculiar swinging and jerking gait jolts one almost to a jelly. Though naturally gentle and obedient, from the ill treatment of their drivers they are very often unruly and even savage, biting severely. The height of the Arabian camel at the shoulder is between 6 and 7 feet, and the color of the rather coarse hair is of various shades of brown. The dromedary is generally used for riding, and the ordinary camel as a beast of burden. The Bactrian camel has two humps, and is a little larger than the Arabian; it has less endurance than the latter, and is loaded with more difficulty, but is used with great advantage throughout central Asia, Thibet, and China, as a beast of burden and draught; in Persia, a very serviceable form of light artillery is mounted on these animals. A fossil camel, larger than any existing species, has been discovered in the tertiary deposits of the Sivalik hills of Hindostan. For interesting anecdotes of this animal, the reader is referred to Broderip's "Leaves from the Note Book of a Naturalist."—Major Wayne's report on the use of the camel in the United States contains much valuable information regarding this animal. He says: "Formed rather for a level than a broken country, the camel meets without inconvenience a fair amount of mountain and valley, and is not distressed in ascending or descending moderate slopes, although they be long. The foot of the camel, clothed with a tough skin, enables it to travel with facility over sand, gravel, or stones. It will also stand a tolerable degree of volcanic debris or rocky soil, and aided by art—provided with a shoe of hide, iron-shod at the bottom, and attached round the fetlock joint—it traverses these impediments without difficulty, and also ice and snow. In wet, clayey, and muddy soils the camel moves with embarrassment, and is apt to slip and slide in it, without the ability to gather itself quickly." Its capacity to carry weight on continuous journeys he estimates, for the strongest camels, at from 450 to 600 lbs., for the common kinds from 300 to 450 lbs.; and these they will carry from 18 to 30 m. a day, according to the character of the country, whether broken or level, over which they travel, moving for the usual daily travelling time of from 8 to 10 hours. With lighter

loads they will travel a little faster. The saddle dromedary, or swift riding camel, he thinks, will carry from 150 to 300 lbs. continually, travelling from 8 to 10 hours, about 50 m. a day. On emergency, they will make from 70 to 90 m. a day, but only for a day or two, over a level country. The true land of the camel is not, as many persons suppose, the tropics or their confines, but rather the northern regions of the temperate zone. They thrive better, and are a larger and stronger animal, in central Asia than in Africa or Arabia, and are as impatient of extreme heat as of intense cold.

CAMEL, a machine for partially lifting ships so as to float them in shoal water, as over bars. It was invented and first applied by the Dutch about the year 1688, in order to carry their ships over the sands of the Zuyder Zee. The appliance used by them consisted of two similar-shaped vessels about 127 ft. long, 22 ft. wide at one end, and 18 at the other. These being brought one on each side of the ship, and secured to it by ropes passing under the keel from one to the other, water was let into each till it sank nearly down to the surface, the ropes being kept tight by windlasses or capstans on the decks of the camels. The water being then pumped out, the camels as they rose lifted the vessel with them. For large ships heavy timbers were run out of the port holes which took the strain as the camels rose under them. By this means ships of war carrying 100 guns were readily made to pass the sand banks of the Zuyder Zee. Similar machines are used for carrying vessels over the bar of New Bedford harbor, and at Nantucket; and they are also used for raising sunken vessels. Floating docks are constructed on the same principle; and vessels are often lightened by the use of empty casks floated on each side, and drawn down by ropes under the keel.

CAMELLIA, a genus of shrubs belonging to the natural order *ternstroemiaceae*, and furnishing the domestic drug tea and some of the most beautiful of cultivated flowers. All the species are natives of China, Japan, or Nepal. They were first imported into Europe by a German Jesuit named Kamel, about the year 1789; and hence the name of *camellia*. They are polypetalous cotyledons, with alternate feather-veined leaves, regular flowers, the petals and sepals both imbricated in aestivation, and have some affinity with the rose tribe. The *C. bohea* and *viridis* are the species whose dried leaves make the tea of commerce. The *C. japonica* is called by the French *la rose de Japon*, or *la rose de la Chine*. It has broad shining leaves and beautiful red or white flowers, single or double, and is the origin of nearly all the varieties now cultivated in gardens. It is greatly admired in China and Japan, and is of frequent occurrence in Chinese paintings. Many of its varieties have been created by the skill of the Chinese, and are remarkable for their brilliant colors and the exquisite symmetry with which their petals are arranged.

These have been imported into Europe and America, and new varieties are annually produced by horticulturists. Forty-five standard varieties have been developed, some having



Camellia Japonica.

single, some double, and some semi-double flowers, and being in color white, red, yellow, or variegated. Camellias thrive best when treated as conservatory shrubs, planted in the open border under glass, freely exposed to light and air, and sufficiently protected from the frost. Thus treated, they become large evergreen bushes, densely covered with foliage, upon which their splendid flowers are conspicuously beautiful, and much more brilliant than when the roots are confined in garden pots and cramped for want of room. They are propagated by cuttings, layers, and buds, as well as by seeds. Only a few seeds, however, can be obtained, and these require two years to come up, but make the best stocks of any. The *C. reticulata*, which grows in China, is esteemed the handsomest of all the varieties. Its leaves are remarkably netted, and it has semi-double flowers, of a deep rose-red color, sometimes 6 inches in diameter. Two species, the *C. sasanqua* and the *C. oleifera*, are cultivated as oleaginous plants in China, and the oil pressed from the seeds is said to be equal to the finest quality of olive oil.

CAMELOPARD. See GIRAFFE.

CAMELOPARDALUS, the camelopard or giraffe, a constellation instituted by Hevelius. It lies between the north pole, the Wagoner, Cassiopeia, and the head of the Great Bear, and contains small stars of the 4th magnitude only.

CAMENZ, or *Kamenz*, a town of Saxony, on the Black Elster, 22 m. N. E. of Dresden; pop. in 1871, 6,406. It is the birthplace of Lessing, and contains a hospital dedicated to his memory Jan. 8, 1826. The town was almost wholly destroyed by fire in 1742.

CAMEO, originally a variegated onyx, or other parti-colored stone, on which figures

and landscapes appeared, and more commonly applied to a gem in different-colored layers, carved in relief with figures contrasting with the color of the background. Varieties of chalcedony, jasper, onyx, sardonyx, and sometimes turquoise, are the most common gems used; but softer and cheaper materials are of late much employed for this purpose. Cameo cutting is an art of remote origin, and the word is of obscure derivation. The art was certainly practised by the Egyptians, and was brought to a high state of perfection by the Greeks; and yet it is probably not so old as the simpler process of carving in intaglio. Besides employing the natural gems, the Romans in the time of Pliny made use of an artificial paste in two colors, called *vitrum obsidianum*. But the hard stones used by the Greeks, by the delicacy of finish of which they are susceptible, and by the durability of the lines carved upon them, have proved a better material for transmitting to distant ages an idea of the high attainments of this cultivated people in art than either bronze or marble. Even now connoisseurs distinguish between modern gems and those cut more than 2,000 years ago, by the superior polish of the latter. In the 4th century cameo cutting had fallen into disuse, the art ending, as it began, in lifeless stone. On its revival in Italy, in the 15th century, gem engraving received especial patronage from Lorenzo and Pietro de' Medici. Specimens of this period rival in perfection those of more ancient times. The art has since continued to be extensively practised in Italy; but its introduction in other parts of Europe hardly extends beyond the present century. The chief peculiarity of the Italian style is the converting of blemishes in the material into points of attraction, and bringing them boldly out in alto rilievo, as if designed for some special representation; while the Greek, seeking perfect harmony in the colors of the gem, by a series of subtle curves and most delicate lines running through its low relief, effectually concealed the labor, made so obvious in the productions of later times. The first cameo of which we have account was the ring of Polycrates, carved by Theodorus of Samos, about 550 B. C. Among the finest cameos are those in the imperial cabinet of St. Petersburg: one of Perseus and Andromeda, on a pale brown sard, the figures of exquisite finish in high relief; the other, known as the Gonzaga cameo, of Ptolemy II. and the first Arsinoë; the same Ptolemy and the second Arsinoë appear on a gem of inferior merit in the Vienna museum. The latter is rich in cameos, and contains among others an apotheosis of Augustus, wrought on an onyx 8½ inches in diameter, which was purchased by Rudolph II. for 12,000 ducats, and is considered by some the finest cameo in the world. The apotheosis of Augustus and the princes of the house of Tiberius, in the national library at Paris, is the largest and one of the most famous of these works; it is a sardonyx measuring 12½ inches

in one direction and 10 $\frac{1}{2}$ in another, and contains 22 figures. It is often known by the name of *agate de la sainte chapelle*, from the holy chapel of the palace to which it was consigned by Charles V. It was there regarded as representing the triumph of Joseph under Pharaoh. It came originally from the East in the 18th century. This collection contains many other choice works of this kind, and among the largest and best is one representing Germanicus carried off by an eagle. In the Vatican at Rome are a renowned cameo said to have belonged to the emperor Augustus, and several antique cameos cut in turquoise. At Naples is one ranked among the finest, representing the apotheosis of Ptolemy on one side, and the head of Medusa on the other. In England there are some remarkable cameos, chiefly in private collections. One of the most celebrated is in the Marlborough collection; it represents the marriage of Cupid and Psyche, and is the work of Tryphon, who is supposed to have lived under the immediate successors of Alexander in Macedonia. Of the ancient cameos, the most noted is the Mantuan vase at Brunswick, representing on one side Ceres seeking her daughter, on the other the goddess teaching agriculture to Triptolemus.—At Yekaterinburg, in the Ural mountains, Atkinson speaks of seeing a workman engaged in cutting a head of Ajax, after the antique, in jasper of two colors, the ground a dark green, and the head a yellowish cream color, in very high relief, and intended for a brooch. It was a splendid production of art, made, however, at a cost for labor of only 8s. 8d. sterling per month, and 36 lbs. of rye flour. In other countries, where this skill commands higher prices, the great expense of cutting these hard substances has led to the substitution of softer materials, and varieties of porcelain and of enamelled glass are now often used. But the material most extensively employed is the shell of various species of mollusca, which, while it is easily carved, presents layers of a fine natural polish and beautiful colors. The use of shells began in Italy about the year 1820, and for some years the whole consumption was about 800 per annum, all of which were sent from England, and sold for about 80s. sterling each. Since then this art has been conducted with great success in Rome, and to a much greater extent in Paris. In 1847 the consumption had become very large in Paris, so that the sales in that year were reported to amount to no less than 100,500 shells, at an aggregate cost of £8,960, and the value of the cameos was estimated at £40,000. The shells are of four varieties, known as the bull's mouth, black helmet, horned helmet, and queen conch. The queen conch is referred to by Woodward as the *cassis Madagascariensis*. This and the *C. tuberosa* he describes as presenting a white upon a dark claret color; the *C. cornuta*, white on orange ground; the *C. rufa*, a pale salmon on orange; and *strombus gigas*, yellow on pink.

The black helmet is probably the *C. tuberosa*, which presents a white upper layer upon a dark, almost black ground. The horned helmet is no doubt the *C. cornuta* with a pink ground. The bull's mouth, the under layer of which is red resembling the sardonyx, is probably the *strombus gigas*. These shells have three layers, the upper and dark-colored serving for the hair, wreaths, armor, &c.; the next, white, for the figure; and the third for the ground. The pieces are cut out of the required size by a metallic blade fed with diamond dust, or emery and water, and are shaped by grinding and whetting. Each piece is then cemented upon a stick, which serves as a handle during the operation of cutting. The design is marked out with a pencil and then scratched in with a sharp point. The cutting is afterward done with the use of a number of delicate pointed instruments made of steel wire, as also of small files and graters. Holtzappel gives particular directions respecting the process. "The general shape should be first wrought, with care to leave every projection rather in excess, to be gradually reduced as the details and finish of the work are approached. To render the high parts more distinct during the process of carving, it will be found convenient to mark them slightly with a black-lead pencil. Throughout the cutting great caution should be observed that in removing the white thickness the dark ground is not damaged, as the natural surface of the dark layer is far superior to any that can be given artificially; indeed, should the ground be broken up at one part, it would be requisite from its lamellar structure to remove the entire scale or lamina from the whole surface, a process that will be found very tedious and much more difficult than the separation of the white from the black thickness. In order that the finished cameo may possess a distinct outline at all points of view, it is desirable to adopt the system followed in antique cameos, namely, to leave all the edges of the figure quite square from the ground, and not gradually rounded down to the dark surface. Should the latter method be followed, it will be found that the outline is in many places undefined, owing to the color of the white raised figure of the cameo gradually merging in that of the dark ground. This evil is entirely avoided by leaving the edges of the figure quite square for the thickness of about $\frac{1}{4}$ of an inch. The surface of the cameo should be finished as nearly as possible with the cutting tools, as all polishing with abrasive powders is liable to remove the sharp angles of the figures, and deteriorate the cameo by leaving the form undefined. When, however, the work has been finished as smooth as possible with the cutting tools, the final polish may be given by a little putty powder used dry upon a moderately stiff tooth brush, applied with care, and rather to the dark ground than to the carved surface; this is the concluding process, after which the cameo is ready for re-

moving from the block prior to mounting." Cameos carved in onyx and carnelian demand more skill, as well as labor, than those in shell. A drawing is first made on an enlarged scale, and from this a model in wax of the exact size. The outline is then drawn on the stone, and the engraving is executed with the tools used by the lapidary for engraving seals, being drills of soft metal, as copper or iron, made to revolve rapidly, and fed with emery and oil. False cameos are sometimes made by carefully cutting out the engraved portion of antique gems and attaching this to a ground of agate of another color. Beudant refers to some cameos in a slaty kind of onyx, *schistes onyx*, which are brought from China as objects of curiosity. They are sheets of rock resembling very compact alates, and presenting three or four differently colored layers; one a brown, which is the ground, others red, white, and greenish. In these the Chinese have sculptured various objects, as the interiors of houses, and landscapes, which are sometimes enlivened with figures of men and animals. Some are so large that they may be regarded as bass reliefs for interior decorations.—The art of cutting cameos in onyx and sardonyx, which for some years has been comparatively neglected, or has been superseded by the cheaper and more easily wrought shell cameos, has recently been revived in Rome and in Paris, though the best productions of these cities are inferior to the work of ancient and mediæval artists. In England the art has never been sufficiently encouraged to induce many artists to pursue it exclusively, though the work of some of the London gem engravers bears a high reputation. Paris is now the chief centre of cameo cutting, and there are to be found the best artists, designs, and facilities for the work. The Franco-German war of 1870 drove out many of these artists, five or six of whom emigrated to New York, where cameo cutting has been carried on to a limited extent for several years, and where there are a few artists who execute in shell portraits and other designs for rings and brooches which are creditable as works of art. But cameo cutting, as a successful business in the United States, is only beginning to exist, and that almost exclusively in New York. A single jewelry house in that city had orders in 1872 for 5,000 cameos, such as ring stones worth from \$2 to \$50 each, and brooches from \$20 to \$250 each; and all these orders were executed in Paris, excepting perhaps 50 stones, and these mainly to complete imported sets, which were cut in New York.

CAMERA LUCIDA, an instrument invented by Dr. Wollaston, and constructed on the principle that when a beam of light in passing through a glass prism strikes an interior surface at an incident angle of more than $48^{\circ} 30'$ it is totally reflected. Let $A B C D$, fig. 1, represent a transverse section of a prism having the sides $A D$ and $D C$ at right angles, the angles A and C each $67^{\circ} 30'$, and the angle

at B 135° . If now a ray of light enter the prism from b perpendicular to the face $D C$, and of course parallel with $A D$, it will pass without refraction to the point a , where it will

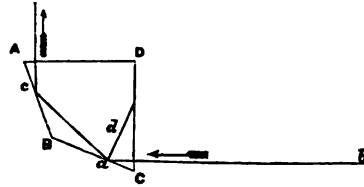


FIG. 1.

be totally reflected in consequence of the angle of incidence $b a d$ being greater than $41^{\circ} 48'$. In this case the angle of incidence will be $67^{\circ} 30'$, so that the sum of the angles of incidence and of reflection, $b a c$, will be 135° , and equal to the angle $A B C$. The reflected ray $a c$ will therefore strike the face $A B$ at c with an angle of incidence of $67^{\circ} 30'$, and suffer reflection in the line $c d$ perpendicular to the face $A D$ ($360^{\circ} - 4 \times 67^{\circ} 30' = 90^{\circ}$). If the eye could be placed anywhere on the line $a c$, it would perceive an inverted image at a of an object at b ; but when the eye is placed at d , an erect image is seen in consequence of the two reflections. But as the instrument is intended as an aid in drawing, it is necessary to have an image of the object projected on a sheet of paper. This is effected by placing the eye so near the edge of the prism that the image and the paper may be seen at the same time, as in fig. 2. In consequence, however, of the image

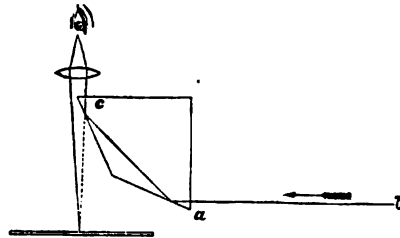


FIG. 2.

appearing further from the eye than the paper, the use of the instrument is attended with considerable practical difficulty, which is only partially overcome by placing a convex lens between the eye and the prism. Few persons ever succeed in obtaining satisfactory results, while some acquire considerable facility of manipulation.—Another form, devised by Amici, is more manageable than Wollaston's, in consequence of not confining the eye to one particular place. A right-angled triangular prism, in place of a quadrilateral one, is employed, which produces two refractions and one reflection. This is represented in fig. 3. The prism is so placed that one of its sides bounding the right angle is perpendicular to a plate of glass which is used as a reflector. Those rays of

light proceeding from the object at *b*, which are caused by refraction to strike the base of the prism, are reflected by its internal surface

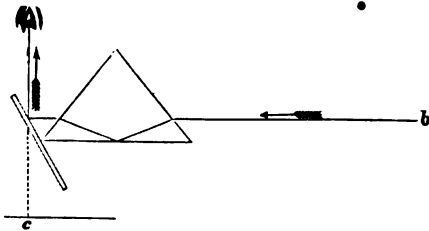
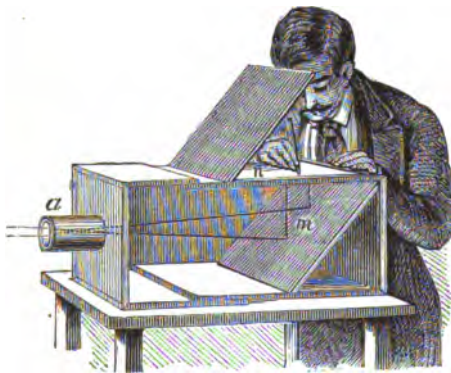


FIG. 3.

to the opposite side of the prism whence they issue, refracted from the perpendicular, and are again reflected by a glass plate to the eye, forming an image which appears as if at *c*, where the point of a pencil may trace its outline on paper.

CAMERA OBSCURA, an instrument invented in the middle ages, according to some by Roger Bacon, and to others by Battista Porta, in which the image of illuminated objects formed by a convex lens is received upon a screen in a darkened chamber, or in a box. It was for centuries used as an amusement, or as a guide in drawing outlines, but by the invention of Daguerre was suddenly invested with new value as the main instrument in photography. The figure represents a camera obscura intended for use in drawing. It consists of a rectangular box made of two parts, one of which slides into the other so that it may be lengthened or shortened, according to the distance



Camera Obscura.

of the object. The rays of light from the object pass through a convex lens *a*, and are reflected from a mirror *m*, placed at an angle of 45°, upon a horizontal plate of ground glass *n*, where they form an uninverted image, which may easily be traced with a pencil.

CAMERARIUS. **I. Joachim**, a German scholar, born at Bamberg, April 12, 1500, died in Leipsic, April 17, 1574. His proper name was Liebbhard, which he changed into Camerarius,

in honor of the office of chamberlain which his ancestors held at the court of the bishop of Bamberg. Educated at Leipsic and Erfurt, his attention was arrested by the writings of Melancthon, and in 1521 he went to Wittenberg to make the acquaintance of that reformer. From this time his life and influence were identified with the reformation. In 1526 he was appointed teacher at Nuremberg, and was afterward sent to the university of Tübingen. The dukes of Saxony, a few years later, employed him to remodel the Leipsic university, of which he afterward became rector. He was at the diet of Augsburg, and gave important aid in drawing up the Augsburg confession; and when in 1555 the diet assembled there again Camerarius continued a prominent delegate, and in the year following was at Ratisbon in the same capacity. He was soon after called to Vienna by the emperor Maximilian II. to counsel in the critical affairs of the empire in regard to religion. Camerarius was a scholar of extensive and varied learning. He cultivated medicine, mathematics, and Greek. His works (more than 150 distinct treatises) are mostly of classical and religious subjects. He translated into German many Greek and Latin authors. His biography of Melancthon (Leipsic, 1592), of which a new edition appeared in Halle in 1777, and his collection of letters of that reformer, are peculiarly interesting to the student of the reformation. **II. Joachim**, son of the preceding, born at Nuremberg, Nov. 5, 1534, died there Oct. 11, 1598. He was sent successively to Wittenberg and Leipsic, and also studied with Melancthon, and received a medical diploma at Bologna in 1562. Botany was his favorite study. A genus of plants (*Cameraria*) was named after him. **III. Rudolph Jakob**, a German physician and botanist, born in Tübingen, Feb. 17, 1665, died there, Sept. 11, 1721. He was professor of medicine and director of the botanic garden at Tübingen, and was the first to observe the male and female generative organs in plants, and to establish the true sexual theory of plants. His principal work is *Epistola de Sexu Plantarum* (Tübingen, 1694 and 1749).

CAMERINO (anc. *Camerinum*), a town of Italy, capital of a district in the province of Macerata, 40 m. S. W. of Ancona; pop. about 12,000. The finest public buildings are the episcopal palace, the cathedral, and the church of Omanzia, with pictures by eminent masters. In the principal square is a statue of Pope Sixtus V. A university was founded here in the early part of the 18th century, and there are many monasteries and a seminary. Silk is the chief article of manufacture.—The ancient Umbrian city of Camerinum (originally Camers) was a place of importance during the earlier periods of Roman history. In the middle ages Camerino formed part of the duchy of Spoleto. In the 18th century it was ruled by the Varano family, a member of which became duke of Camerino in 1520. Ottavio Farnese obtained

supreme power in 1589, and subsequently, when he was made duke of Parma, Camerino became part of the Papal States, and capital of a legation till its incorporation with the kingdom of Italy in 1860.

CAMERON, the name of three counties in the United States. I. A N. W. central county of Pennsylvania, intersected by Sinnemahoning creek; area, 400 sq. m.; pop. in 1870, 4,278. The surface is hilly, and generally covered with forests. The Philadelphia and Erie railroad traverses it. The chief productions in 1870 were 2,658 bushels of wheat, 21,795 of Indian corn, 17,152 of oats, 20,535 of potatoes, and 2,153 tons of hay. There were 254 horses, 394 milch cows, 407 other cattle, 1,042 sheep, and 359 swine. Capital, Emporium. II. A S. W. parish of Louisiana, bordering on the gulf of Mexico, and intersected by Mermen-teau river; pop. in 1870, 1,591, of whom 842 were colored. The surface is low and swampy. The parish was formed in 1870 from portions of Calcasieu and Vermilion parishes. The chief productions in 1870 were 14,451 bushels of Indian corn, 7,518 of sweet potatoes, 696 bales of cotton, and 14 hhds. of sugar. There were 1,343 horses, 1,165 milch cows, 8,238 other cattle, 3,840 sheep, and 2,794 swine. Capital, Grande Chenière. III. A S. county of Texas, on the gulf of Mexico, and separated from Mexico by the Rio Grande; area, 3,000 sq. m.; pop. in 1870, 10,999, of whom 157 were colored. It is watered by several streams, which have an E. course, and contains part of Isla del Padre, which is separated from the mainland by a narrow body of water called Laguna de la Madre. There are many lakes, several of which yield salt. The valley of the Rio Grande is fertile, but the remainder of the county is only adapted for grazing. The chief productions in 1870 were 38,487 bushels of Indian corn, 500 tons of hay, 14,450 lbs. of wool, and 118 bales of cotton. There were 5,488 horses, 928 milch cows, 40,802 other cattle, 7,630 sheep, and 1,837 swine. Capital, Brownsville.

CAMERON, John, a Scottish theologian, born at Glasgow about 1579, died at Montauban, France, about 1625. He was educated at the university of Glasgow, where at the age of 19 he lectured upon the Greek language, which he spoke with facility. In 1600 he went to France, became rector of the university of Bergerac, then for two years professor of philosophy at Sedan, whence he removed to Bordenaux. By a provision of the church here four students of theology were maintained from the church funds. Cameron was nominated one of these, and spent the next four years at Paris, Geneva, and Heidelberg. In 1608 he became pastor at Bordenaux, and in 1618 professor of theology at Saumur. The university being dispersed in 1621 in consequence of the civil war in France, Cameron returned to Glasgow, where he was for a year regent of the university. He went back to France, and in 1624 became professor of theology at Montauban. The doctrine of pas-

sive obedience, which he had promulgated, exposed him to the censures of many Protestants, and he withdrew to Moissac, but soon returned to Montauban, where he died of a wound given in the street by an unknown hand. He held some peculiar doctrines on the action of the will, which distinguished him from the Calvinists, and also from the Arminians. His theory of will was based on the position that it could only be acted on by motive appealing through the judgment or intellect. He also taught the universality of the effects of Christ's sacrifice, and was designated a Universalist. His followers were styled Amyraldists from his disciple Molse Amyraut, and also from himself Cameronites. They are to be distinguished from Cameronians. His works, including posthumous remains, were published at Geneva in 1658.

CAMERON, Richard, a Scottish preacher, founder of the Cameronians, born in Falkland, Fife-shire, killed July 20, 1680. His father, a small shopkeeper, was an Episcopalian. Cameron followed for a time the same religious faith, and was appointed master of the parish school. This made him *ex officio* the precursor of the parish church. But having heard some field preachers, he was converted to Presbyterianism. Resigning his office as parochial master, he was ordained as a field licentiate. The Presbyterians were at that time divided into two parties, on account of a bill denominated the indulgence, which, by making their worship legal, was designed to harmonize them with the government and the established religion. Some of the ministers accepted the indulgence; others refused its protection, and opposed their brethren for acquiescence. Cameron soon became a powerful leader of the opponents, and when the government issued a proclamation to suppress them, he found it necessary to flee to Holland. He returned in 1680, renewed his hostility to the course of the government, and pushed his opposition to such an extreme that, soon after the defeat at Bothwell Bridge, he marched into Sanquhar at the head of his troops, and formally declared war against the government. Near Aird's Moss his band was attacked by the royal troops; he was killed, and his head and hands were cut off, carried to Edinburgh, and exposed on Netherbow Port. His name, first applied to his followers, has been since improperly extended to the persecuted Scottish Presbyterians in general.

CAMERON, Simon, an American senator, born in Lancaster co., Penn., March 8, 1799. He became a printer, and in 1820 the editor of a newspaper at Doylestown. In 1822 he removed to Harrisburg, where he edited a democratic journal, became president of a bank, and subsequently of two railroad companies. In 1845 he was elected United States senator to fill the vacancy caused by the resignation of Mr. Buchanan, his term closing in 1849. He acted with the democratic party, voting in favor of declaring that war existed with Mexico,

and in favor of the proposition to extend the Missouri compromise line to the Pacific. After the repeal of the Missouri compromise in 1854 he allied himself with the republican party, and in 1857 was again elected United States senator. In the republican convention held at Chicago in May, 1860, he was proposed as a candidate for the presidency, and on the first ballot received about 50 votes. Mr. Cameron's name was then withdrawn, his friends voting for Mr. Lincoln. On Lincoln's inauguration, March 4, 1861, Mr. Cameron became secretary of war. He remained in the cabinet till Jan. 14, 1862, when he resigned, and was appointed minister to Russia, being succeeded as secretary of war by Mr. Stanton. He retained the mission to Russia only a short time, and returned to America in November, 1862. In 1866 he was again elected to the United States senate, and in 1872 was chosen chairman of the committee on foreign relations, in place of Mr. Sumner. He was reelected as a senator in 1878.

CAMERONIANS, a sect of Scotch Presbyterian dissenters, named after Richard Cameron. James I. had enforced on his Scottish subjects a liturgy which the people abhorred. This exercise of the royal prerogative led in 1688 to the formation of the covenant, "in behalf of the true religion and freedom of the kingdom." The organization of the Scottish presbytery was still further completed in the adoption of the Presbyterian form of church government, a Calvinistic confession of faith, and the two catechisms, which documents are still the standards of the Scottish kirk. The act of 1661 of the English and Scotch parliaments against conventicles, the legalized persecutions under Turner, Dalziel, and Drummond, the famous writ of law-burrows issued by Charles II. in 1670, the intercommuning expedient of Lauderdale and Sharpe, and the execution of Mitchell in 1679, had all contributed to exasperate the Covenanters to a point where they thought forbearance ceased to be a duty. The Covenanters had made a stand at Bothwell Bridge, and had been disastrously defeated. Many of them sought to screen themselves from royal vengeance by frequenting the churches of the indulged ministers. But a few, headed by Cameron and Cargill, met at Sanguhar, June 22, 1680, and there promulgated "A Declaration and Testimonie of the true Presbyterian, Anti-Prelatic, Anti-Erastian, and Persecuted Party in Scotland," proclaimed war against the king as a tyrant and usurper, and protested against receiving the duke of York in Scotland. Only 66 men could be mustered to sustain this declaration. They took their stand at Aird's Moss on July 20 following, where Cameron and several of his followers fell in a skirmish. Cargill escaped and continued to preach the doctrines of the sect in fields and woods. When the royalists added the test (1681), the Covenanters, or Cameronians, as they were henceforth known, formally denounced it at Lanark, Jan. 12, 1682, and

again affirmed the Sanguhar declaration. This they repeated in 1684, and again in 1685, on the accession of the duke of York as James II. They remained inflexible throughout the reign of that king, and supported the prince of Orange on his assuming the crown of England, but were displeased by the form in which the Presbyterian church was restored. They subsequently exerted all their influence against the union of Scotland and England. They are a Scotland sometimes denominated "Old Presbyterian Dissenters," as Calvinistic in doctrine, Presbyterian in government, and dissenters from the church of Scotland. The presbytery of this denomination was not organized till Aug. 1, 1748, when an act of toleration was procured in their favor, under the appellation of the "Reformed Presbytery." They are now, both in Great Britain and the United States, called Reformed Presbyterians. (See PRESBYTERIANISM.)

CAMEROONS, or *Camerones*, a river of Upper Guinea, on the W. coast of Africa. It enters the bight of Biafra by an estuary 20 m. wide, in which are several large islands. Around its mouth the shores are overgrown with mangroves. For about 40 m. above this it preserves an average breadth of 400 yards, and at a point 90 m. distant from the sea it forms a cataract. During the rainy season it is navigable by vessels of any size, but in the dry season its depth is only from 2 to 20 ft. Its total length is unknown. On one of the islands at its mouth is the town of Cameroons, the centre of an important commerce, importing salt, powder, cloths, hats, and arms, and exporting gum, pepper, ivory, and palm oil.

CAMEROONS MOUNTAINS, the loftiest group upon the W. coast of Africa, lying between lat. 8° 57' and 4° 25' N., and lon. 9° and 9° 30' E. covering an area of about 700 sq. m. They form a huge volcanic mass, the highest summits of which are said to reach an elevation of 13,000 ft. Upon the west the Cameroons touch the gulf of Guinea and the low tract bordering the estuaries of the Rumbi and Old Calabar rivers; upon the south they also come down to the gulf; upon the east they touch the western branch of the Jamur, the eastern branch of which forms the estuary of the Cameroons river, between Cape Cameroons on the north and Cape Suellaba on the south. The summit of the Cameroons was first ascended by Capt. R. F. Burton and the German botanist Mann at the end of December, 1861. Up to the height of about 4,000 ft. the sides of the mountains are covered with a dense growth of palms, acacias, many species of the fig tree, cardamoms, cabbage trees, African oaks, ericas, enormous ferns, and bamboos; and still higher up by smaller trees and plants. At the elevation of 4,850 ft. begins a labyrinth of lava streams and fields of slag. At the height of 7,900 ft. appear the first craters, of which there are about 28. The natives of the region say that there was an eruption as late as

1838. The lower slopes of the mountains appear to be well adapted to the culture of cacao, coffee, and sugar, although the banana and the cocoanut are the principal productions.

CAMILLUS, *Marcus Furius*, a Roman magistrate, died of pestilence in 365 B. C. His name is connected with some of the greatest events in the history of the republic. His virtues and exploits are recorded, and probably exaggerated, by Livy and Plutarch. He appears first as censor in the year 408 B. C., then several times as consular tribune, five times as dictator, and twice as interrex. Having served during the siege of Veii, and in the war against Falerii, he defeated in his first dictatorship the Falisci, Capenates, Fidenates, and other tribes, advanced to Veii, penetrated through a subterranean passage into the city, and thus put an end to its siege, which had already lasted ten years. He made his triumphal entrance at Rome in a chariot drawn by four white horses, and asked the tenth part of the booty, to accomplish a vow to Apollo; whereupon his enemies accused him of pride and extortion. But he earned new glory by the conquest of Falerii. His continued opposition to the emigration of the people to Veii rendered him unpopular. Having been charged with embezzling a part of the booty of that city, he left Rome, and was living in exile at Ardea when the Gauls under Brennus invaded and pillaged Rome. He repulsed them from Ardea, was secretly recalled by the defenders of the capitol, and appeared at Rome, according to a legend, at the head of an army, at the moment when the gold for which the Romans purchased peace was being weighed before the conqueror. "Rome buys her freedom with iron," he exclaimed, and attacking the Gauls routed them twice, had a new triumph, was called a second Romulus, and prevented the desertion of Rome, now in ruins. He subsequently defeated a coalition of the Æqui, Volsci, Etruscans, and Latins; was successful in a war against Antium; had to struggle against the rivalry of Manlius; endeavored in vain, as dictator for the fourth time (367), to resist the Licinian rogations in favor of the plebs; and, as dictator for the fifth time, was at the age of 80 again victorious over the Gauls.

CAMINATZIN, or *Cacumazin*, a Mexican king, died in 1521. He was nephew of Montezuma, and reigned over Tezcuco, the principal city of Anahuac. The nobles, priests, and people saw with indignation the humiliation of their king and kingdom under Cortes and the Spaniards. Caminatzin proposed a declaration of war against the foreigners. The proposal was received with enthusiasm, and Caminatzin called upon the Spaniards to leave the country immediately, or to expect to be treated as enemies. Cortes was preparing to march against Tezcuco, when the representations of Montezuma concerning the defenses of the town and the daring of the population induced him to change his plan, and to resort to treason instead of force. At his instigation Montezuma invited

his nephew to Mexico to become reconciled with the Spaniards. The answer of Caminatzin was that he could enter Mexico only to destroy the oppressors of his country. Montezuma then despatched secret agents to Tezcuco to get possession of the young prince. His officers and friends were corrupted, and he was delivered by them to Cortes and imprisoned. He was released after the expulsion of the Spaniards, and is supposed to have perished soon after in the siege of Mexico.

CAMISARDS (so called from the *camisa*, a kind of smock frock which they wore), French Protestants of the Cévennes, who rebelled at the beginning of the 18th century; they are also called Cévenols. As early as the 13th century the Albigenses and Waldenses had taken refuge in the Cévennes, where they were occasionally subjected to persecution. After the reformation they adopted the Calvinistic creed. They were of a peaceful disposition, but during the reign of Louis XIV. were subjected to a long series of persecutions. Prominent among their enemies was the abbé du Ohayla, who subjected many of them to torture. One night in 1702 a few hundred of them stole to the castle of Pont de Montvert, his residence, seized the abbé, and put him to death. This was the signal of general rebellion. The Camisards flew to arms. "No taxes" and "Liberty of conscience" were the devices inscribed on their standards. Among their leaders were Roland, who had served in the army and possessed some military knowledge; Jean Cavalier, a journeyman baker, who evinced remarkable talents; Ravenal and Abdias Manuel, surnamed Catinat. The marshal de Montrevel, who was first sent against them, thought that terror and severity were the only means of subduing them; their villages were burned, and the prisoners hanged or broken on the wheel. The Camisards in their turn burned and pillaged Catholic villages, sacked churches, and massacred priests. Marshal Villars, who succeeded Montrevel, tried clemency and persuasion, and brought a number of Camisards to terms, among them Jean Cavalier, who was then the ablest and most popular of their chiefs. But this submission did not bring the contest to a close. Cavalier was denounced as a traitor by his brethren; the other leaders, and especially Roland, continued to resist. But Roland having been killed in 1704, hostilities slackened, the country was apparently pacified, and Villars left it for other service. In 1705, however, Marshal Berwick had again to crush an insurrection. A few years later, through the agency of some Dutch emissaries, a new rising took place in the Vivarais, a part of the Cévennes country; and its suppression was a hard task for the government of Louis XIV. The Camisards were honest and virtuous people, but their name was wrongfully assumed by troops of robbers who, about the same period, pillaged some parts of Languedoc.

CAMMIN, or *Kammin*, a town of Pomerania, Prussia, on the Dievenow, near the Baltic sea, 37 m. N. of Stettin; pop. in 1871, 5,261. It is the seat of a female normal school and a hospital. The chief occupation of the inhabitants is distillation and fishing. The bishopric of Cammin was suppressed in 1648, but the chapter continued down to 1812.

CAMMERHOFF, John Frederick, one of the first bishops of the Moravian church in America, born near Magdeburg, Germany, July 28, 1721, died at Bethlehem, Penn., April 28, 1751. He came to America in 1746 as assistant to the presiding bishop of the Moravian church. Bethlehem was at this time the centre of missionary operations among the Indians, in which he was notably active. He won the confidence of the natives, especially of the Delawares and the Six Nations, and in 1748 he was formally adopted by the Oneidas as a member of their tribe. In 1750 he attended an Iroquois council at Onondaga, N. Y., travelling by canoes up the Susquehanna for 13 days, and thence on foot through the mountain region of southern New York for a fortnight more. This journey broke down his constitution, and he died soon after his return to Bethlehem.

CAMOËNS (Port. *Camões*), *Luiz de*, a Portuguese poet, born in Lisbon in 1524, died there in 1579. His father was a sea captain, and was shipwrecked in 1552 on the coast of Goa. The son commenced his studies in 1538 at the university of Coimbra, which he left with a high literary reputation; but a passion which he conceived for a lady of the court, Catarina de Atayde, blighted his prospects in the very commencement of his career. The lady's family discountenanced his suit; and the king, John III., himself supposed to have been in love with the young lady, banished him from the capital. Catarina could not bear the separation from her lover, and died of a broken heart. He survived her about 30 years, but never married. In his despair at her loss he joined the Portuguese expedition against Morocco, and lost one of his eyes, which disfigured him for life. On his return to Lisbon in 1552 he was disappointed in his expectation of employment at court, and in the following year proceeded to Goa. There he gave offence to the authorities by a satirical poem, *Disparates na India*, in which he says of the Portuguese officeholders in India, "Honor and self-interest are never found in the same sack" (*Pois honra e proveito não cabe num sacco*). He was banished to Macao, where he received the appointment of *provedor dos defunctos* (administrator of the effects of the deceased), and the small salary connected with this office was sufficient for his support. The great discoveries which had disclosed to Portugal the Cape of Good Hope and the key to the Indies, the stirring conflicts with the Moors, the efforts of missionaries to Christianize, while explorers strove to colonize, and, above all, the general impetus which at this time pervaded Europe,

exerted a powerful influence upon the ardent imagination of Camoëns. He resolved to do for Portugal what Homer had done for Greece, and wrote his "*Lusiad*" (*Os Lusíadas*), so called after the mythological hero *Lusus*, who, in company with Ulysses, is said to have visited Portugal and founded the city of Lisbon under the name of Ulyssipolis. This great epic was completed by Camoëns during his stay in Macao, where a grotto is still pointed out to which the poet frequently resorted to write. In 1561 he received permission to return to Goa. But here one calamity after another befell him. First stripped of everything he possessed by a shipwreck, he was thrown into prison for debt immediately after his arrival and detained till 1569, when he returned to Lisbon, where the rest of his life was spent in poverty. King Sebastian granted him a pension of 15,000 reis (equivalent to \$31) a year; and even this pittance was subsequently withheld. For some time he was supported by a Javanese servant, Antonio, who collected alms for him during the night and nursed him during the day; and afterward he was removed to the hospital, where he died. After his death he was called the *Apollo Portuguese*, *Camões Grande*, a monument was erected to his memory, and medals were struck in his honor. His "*Lusiad*" was translated into foreign languages, and warmly praised by both Tasso and Lope de Vega. Tieck founded a novel upon the poet's death (*Tod des Dichters*); Münch-Bellingshausen (Friedrich Halm) a drama, *Camões*; and Portuguese and foreigners still flock to the *Lusiad* grotto at Macao. Besides the "*Lusiad*," he wrote sonnets, which are devoted to love, chiefly to his love for Catarina, to the celebration of virtue, and to friendship. The sonnets written shortly before his death breathe the purest imagination. The most celebrated of his *Redondilhas* is that suggested to him by his escape from shipwreck. He also wrote *Cancions* on the model of Petrarch's *Canzoni*, odes, ecstasies, elegies, stanzas composed in *ottava rima*, eclogues, and three comedies: *El Rey Seleuco*, founded upon the anecdote of the king who resigns his wife, Stratonice, to his son Antiochus; *Filademo*; and *Os Amphitryões*. His most valuable contribution to the Portuguese stage. His fame, however, rests upon his "*Lusiad*." Patriotism is the leading sentiment of this national poem, which abounds in picturesque descriptions of storms and scenery, and in pathetic allusions to Portugal's influence in extending the area of Christendom. The most remarkable passages are those referring to the tragic end of Inez de Castro, and to Adamastor, the mythological ruler of the sea, who uses his supreme influence for the purpose of stopping the progress of Vasco da Gama. The first edition of the "*Lusiad*" appeared in 1572. A magnificent edition was published by Didot in 1817. His complete works were edited by Barreto Feio and Monteiro (Hamburg, 1834). The best English translation is that of Mickle-

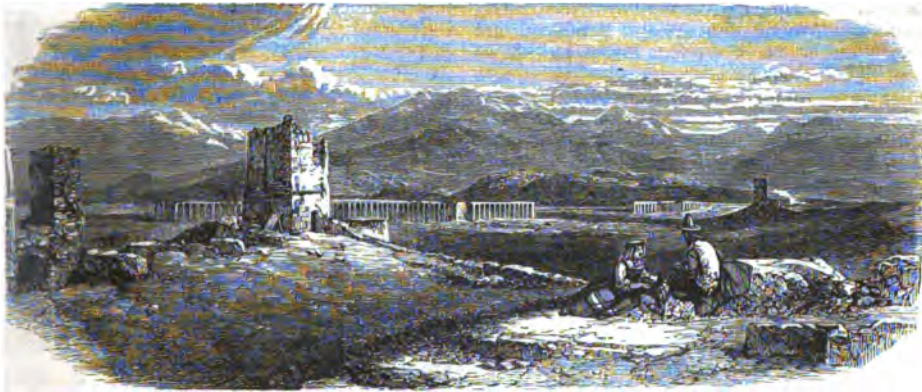
(first ed., 1775). The Spanish translators are Gomez de Tapia, Garzes, and Lamberto Gil. It has been translated into French by Millié; into German by Donner (1833), Booch-Arkossy (1854), and Eitner (1869); into Italian by Nervi; and into Polish by Przybylski. See "Memoirs of the Life and Writings of Luiz de Camoëns," by Adamson (2 vols., London, 1820).

CAMORRA (probably from Span. *camorra*, quarrel), a secret society of Neapolitan malefactors, which flourished especially under the reign of Ferdinand II. (1830-'59), who tolerated them. They were thoroughly organized in every important city of the Two Sicilies, and in Naples alone they had 12 central stations, each with an absolute chief, and a *contarolo* or accountant, the money extorted by the various branches being deposited in the *barattolo* or common exchequer and divided into equal parts among the members. The candidates for admission had to furnish evidence that they had not been spies or thieves, and that their wives and sisters had not been prostitutes; and they were bound to secrecy and obedience by an oath on the crucifix. The candidate was apprenticed to an old *camorrista* as a *picciotto d'onore*; after a year's satisfactory probation he was advanced to the grade of a *picciotto di sgarro*, but he was not received into the ranks of the *camorristi* proper until he had given full proofs of daring and obedience to orders. They wore a scarf of peculiar pattern, and carried two knives and a large club, by which they recognized each other. Treason to the society was punished with death. Serious quarrels

among themselves were settled by duels; minor disputes were decided by the chief. They had an *argot* or slang language unintelligible to others. They devoted themselves to all kinds of fraud and violence, were often found in gambling houses and all places of public resort, and sometimes appeared as lottery dealers, peddlers, or beggars. They were wont to raise mock quarrels among themselves, under cover of which they could plunder the bystanders. In 1848 King Ferdinand attempted to secure their coöperation against the revolutionists, but the negotiations fell to the ground on account of their exorbitant demands. In 1860, under Francis II., an effort was made to employ them to assist the police, but after a time they became only the more formidable, and in 1862 Gen. Lamarmora had 300 of them expelled in one day. Of those left behind, some joined the Garibaldians, and as late as 1873 many of them, in spite of the exertions of the authorities, appeared as smugglers and brigands.—See *La Camorra, notizie storiche*, by Monnier (Florence, 1868).

CAMPAGNA, a town of Italy, in the province and 20 m. E. of Salerno; pop. about 9,000. It is surrounded by lofty mountains, and contains a cathedral, churches, convents, a college, &c.

CAMPAGNA DI ROMA, the plain surrounding Rome. It nearly coincides with the ancient province of Latium, is bounded N. by the Tiber and Teverone, E. by a branch of the Apennines, S. and S. W. by the Mediterranean, and is about 65 m. long by 40 m. broad. It is volcanic, the lakes lying in craters, some of which,



Campagna of Rome.

as that of Lake Regillus, have a regular conical form. The N. and N. E. part of the Campagna, lying on the slopes of the Apennines, is pleasant and salubrious, but the lowlands are afflicted by a malaria which is disastrous to life and health. The Campagna includes the Pontine marshes, which were formed by several small streams, including the Ufens, Nymphæus, and Amasenus, which, finding no outlet to the sea, spread over the land. (See PONTINE

MARSHES.) Hot sulphur springs are found between Rome and Tivoli. In early days the Campagna contained many small cities. Of the inhabitants, the Albans were the most powerful. When the Romans conquered them, these cities were destroyed. They were afterward re peopled from the capital, but rebelling, were punished, and finally were left entirely desolate. In the time of Diodorus, 20 B. C., decay and desolation were noticeable in many

parts of Italy. Strabo, some 80 years later, also spoke of this fact. According to Pliny, the farms in the Campagna belonged to proprietors who resided in the city, and left them to the labor of slaves and the care of overseers. He states that C. Cæcilius Claudius Isidorus died, leaving 4,116 slaves. The climate of this region around Rome has considerably changed since the palmy days of the city. In 480 B. C. there was snow upon the ground for 40 days, but now it is rarely present for two successive days. During the winter and early spring the vegetation is rich and flourishing, but in summer the Campagna has a dry and barren appearance. The laborers upon the farms are peasants from the hills, strong, hardy men, but many of them are always more or less affected by the malaria. The principal modern towns are Tivoli, Velletri, Frascati, Terracina, Ostia, and Palestrina.

CAMPAN, a town of France, in the department of Hautes-Pyrénées, in the valley of the same name, 18 m. S. E. of Tarbes; pop. about 3,700. The valley is bounded by Mont Aigre, traversed by the river Adour, contains the ancient convent of Medous, the priory St. Paul, and the village l'Espoune. It is celebrated for its picturesque scenery, for its stalactite grotto, and for its quarries of marble, which extend along the Adour and the road leading to Bagnères de Bigorre. The finest of these are the green and flesh-colored varieties, with red and white veins, known as the Campan marble, and the blood-red, or Griotta, full of fossilized shells, the spirals of which are disclosed in cutting. Knitting the fine wool of the Pyrenees, brought from Spain, gives employment to many females. Among the articles produced are shawls and scarfs of woollen gauze, as thin as lace. The so-called *crêpe de Barèges* is also made here. Jean Paul Richter's *Campanerthal* was inspired by the beauties of this valley.

CAMPAN, *Jeanne Louise Henriette Genest*, a French teacher, born in Paris, Oct. 6, 1752, died at Nantes in 1822. She was appointed reader to the daughters of Louis XV. when only 15 years old, and after her marriage with M. Campan was attached to the person of Marie Antoinette. She showed great devotion to the queen during the revolutionary troubles, and barely escaped with her life on the storming of the Tuileries. Bereft of all her fortune by the revolution, she opened a young ladies' boarding school at St. Germain in 1794, secured the patronage of Mme. Beauharnais, afterward the empress Josephine, and attracted the attention and won the esteem of Napoleon, by whom she was in 1806 appointed superintendent of the school founded by him at Écouen for the daughters, sisters, and nieces of officers killed on the battle field, over which she presided seven years until it was suppressed by the Bourbons. She was the sister of M. Genest, the French minister to the United States during the second administration of Washington. Her works upon educa-

tion scarcely rise above mediocrity; but her *Journal anecdotique*, *Correspondance inédite avec la reine Hortense*, and *Mémoires sur la vie privée de Marie Antoinette* are full of interest.

CAMPANELLA, *Tommaso*, an Italian philosopher, born at Stilo in Calabria, Sept. 5, 1568, died in Paris, March 21, 1639. When very young he displayed unusual aptitude for learning, especially languages. His father wished him to become a lawyer, but he joined the Dominicans and studied theology. When but 17 years of age, studying at Cosenza, his professor was engaged to take part in a discussion upon philosophy; but being unwell, he sent Campanella in his place, who astonished his audience by the force of his argument against Aristotle. In 1590 he published his own opinions; the work gained him some admirers, but so many enemies that he left Naples and went successively to Rome, Venice, Florence, Padua, and Bologna. In 1598 he returned to Naples, and went thence to his native place. Being suspected of joining a conspiracy against the Spanish government, he was seized and put to the rack, and finally carried to Spain and imprisoned. In 1626 Pope Urban VIII. obtained his extradition from Philip IV. of Spain, and he was transferred to the inquisition at Rome. He was set at liberty in 1629, and in 1634 fled to France. By the aid of Richelieu he received from Louis XIII. a pension of 2,000 livres. He entered a Dominican convent, where he ended his life. Campanella was distinguished rather for undermining other systems than for raising one of his own. His most celebrated works were written during his imprisonment. Among them are the following: *Philosophia Rationalis*; *Universalis Philosophia*; *Apologia pro Galileo* (4to, 1622); *De Prædestinatione, Electione, Reprobatione, et Auxiliis Divinae Gratiæ, contra Thomisticos* (Paris, 1636); and *De Monarchia Hispanica* (translated into English, London, 1634).

CAMPANHA, an inland town of Brazil, in the province of Minas Geraes, 180 m. N. W. of Rio de Janeiro; lat. 21° 42' S., lon. 45° 46' W.; pop. 3,200. The streets are regular, and cross each other at right angles; the houses, for the most part built of mud and detached, are surrounded each by a garden. There are several churches, a college, two schools, a theatre, hospital, prison, and town hall. The inhabitants are mainly occupied in mining.

CAMPANI, *Matteo* and *Giuseppe*, two brothers natives of the diocese of Spoleto, Italy, lived in the latter half of the 17th century. Matteo, the elder brother, or Campani Alimenia, as he was called, was a curate in Rome. Both of them are known in science as opticians. Matteo was the inventor of illuminated clock dial, and celebrated for being the first to grind object glasses of great focal length; 206 palms, or 160 feet focal distance, being the largest. With Campani's object glasses, two of the satellites of Saturn were discovered. He was the inventor of the magic lantern, and made some

experiments with triple eye-glasses, to destroy chromatic aberration. The thermometrical irregularities of pendulum vibrations also engaged his attention. The younger brother, Giuseppe, was also an optician and astronomer, constructing his own telescopes.

CAMPANIA, a division of ancient Italy, lying S. E. of Latium, from which it was separated by the river Liris, bounded N. and E. by Samnium, S. E. by Lucania, and S. and W. by the Tyrrhenian sea. The largest river was the Volturnus; the smaller streams were the Liris (now Garigliano), Sarnus, Sebethus, and Silarus. It contained several lakes, most of them filling the craters of extinct volcanoes; the largest of them were Acherusia, Literna, Lucrinus, and Avernus, W. of Monte Nuovo. Within its borders are Mount Vesuvius and the buried cities of Herculaneum and Pompeii. Besides these its principal cities were Baiæ, Nuceria, Neapolis, Salernum, and Capua. The first inhabitants of Campania were Ausones and Osci or Opici, subsequently conquered by the Etruscans. In the time of the Romans, the Sidicini dwelt in the northwest near the frontier of Samnium, and the Picentini inhabited the S. E. portion of the country. Campania is now included in the provinces of Naples, Benevento, Caserta, Salerno, and Avellino. The region is volcanic, and the soil extremely fertile. In some parts crops are harvested three times in a year. This fertility, joined with an equable climate, an air mildly tempered by soft sea breezes, and beautiful scenery, gave the title *Felix* to the land, and it is still called *Campagna Felix*. The chief products are wine, grain, and olive oil. A peculiar kind of white clay or chalk, used extensively in ancient Italy for mixing with *alica* (grits or cracked grain), was found near Puteoli. Sulphur was exported from the same locality.

CAMPANILE (Ital., from *campana*, a bell), a bell tower, either attached to a church or an independent edifice. The most remarkable specimens are those at Cremona, Florence, Pisa, Bologna, Ravenna, and Seville. The tower at Cremona is 396 ft. high, 498 steps leading to the summit. It was begun in 1283, and the bells were cast in 1578. In the third story is a very large astronomical clock, built in 1594. The one at Florence was commenced by Giotto in 1334; after his death the tower was continued by Taddeo Gaddi. It is 276 ft. high, and divided into four stories, of which

the first and fourth are higher than either of the other two. On the basement story are two ranges of tablets in relief, designed by Giotto, and executed partly by him, and the remainder by Andrea Pisano and Luca della Robbia. Above these are 16 large statues, four on each side of the tower. The cost of this campanile was very great, about 1,000 florins for each braccio, which is 2 ft. square. The leaning tower of Pisa was begun in 1174 by Bonannus of Pisa and William of Innsbruck. It is 179 ft. high, cylindrical in form, and 50 ft. in diameter. The summit is reached by 330 steps. The fact which gives it the name by which it is so well known is that it leans about 13 ft. from the perpendicular. This fault was manifest before its completion, and was guarded against by extra braces, and an adaptation of the stone in the highest portion. The seven bells on the top, the largest of which weighs 12,000 lbs., are so placed as to counteract by their gravity the leaning of the tower. The Garisenda in Bologna is about 150 ft. high, and leans 8 ft. 6 in. The Asinelli in the same place is 293 ft. to the base of the lantern, or including that, 321 ft., and leans 8 ft. 6 in. The Seville cathedral has a campanile 350 ft. high. It was originally only 250 ft., the rich fligree belfry, 100 ft. high, having been added in 1568. This tower is called *La Giralda*, from a brazen figure in the top, which weighs a ton and a half, yet turns with the wind.

CAMPBELL, the name of four counties in the United States. **I.** A S. county of Virginia, lying between James river on the N. and Staunton river on the S.; area, 576 sq. m.; pop. in 1870, 28,884, of whom 14,343 were colored. It has an uneven surface and a fertile soil. Iron ore is obtained in some places, and granite is abundant. Oak and pine forests cover much of the hilly part of the county. The Atlantic, Mississippi, and Ohio railroad passes through the N. part. The chief productions in 1870 were 77,057 bushels of wheat, 226,690 of Indian corn, 175,733 of oats, and 1,761,901 lbs. of tobacco. There were 1,877 horses, 2,591 milch cows, 3,068 other cattle, 3,569 sheep, and 8,272 swine. Capital, Campbell Court House. **II.** A N. W. county of Georgia, intersected by the Chattahoochee river; area, 360 sq. m.; pop. in 1870, 9,176, of whom 2,587 were colored. It has an irregular surface, and embraces several varieties of soil. Gold, iron, and soapstone are found. The Atlantic and West Point railroad passes through the S. E. part. The chief productions in 1870 were 38,478 bushels of wheat, 159,502 of Indian corn, and 2,621 bales of cotton. There were 424 horses, 826 mules and asses, 1,104 milch cows, 1,419 other cattle, 2,731 sheep, and 5,288 swine. Capital, Campbellton. **III.** A N. E. county of Tennessee, bordering on Kentucky, bounded S. E. by Clinch river, and watered by its affluents; area, 450 sq. m.; pop. in 1870, 7,445, of whom 428 were colored. The surface is hilly, the central part being traversed



Giotto's Campanile.

by a ridge of the Cumberland mountains. Large forests occupy a considerable portion. The chief productions in 1870 were 18,401 bushels of wheat, 127,145 of Indian corn, 65,208 of oats, 1,069 tons of hay, and 200 hds. of sugar. There were 1,390 horses, 1,488 milch cows, 3,198 other cattle, 6,671 sheep, and 9,784 swine. Capital, Jacksonborough. IV. A N. county of Kentucky, on the Ohio, nearly opposite Cincinnati, and bounded W. by Licking river; area, 120 sq. m.; pop. in 1870, 27,406, of whom 282 were colored. The surface consists of level bottom lands and gently undulating tracts of uplands; the soil is fertile. The chief productions in 1870 were 18,366 bushels of wheat, 166,509 of Indian corn, 69,599 of oats, 66,989 of potatoes, 3,603 tons of hay, and 76,568 lbs. of tobacco. There were 2,384 horses, 2,173 milch cows, 1,458 other cattle, 2,793 sheep, and 7,616 swine. Capital, Alexandria.

CAMPBELL, Alexander, founder of the religious sect calling themselves "Disciples of Christ," but commonly known as Campbellites, born in county Antrim, Ireland, in June, 1786, died at Bethany, W. Va., March 4, 1866. His father, Thomas Campbell, a relative and classmate of Thomas Campbell the poet, was a Presbyterian clergyman, who emigrated to America in 1807, followed two years afterward by his son Alexander, who had been educated at the university of Glasgow. He took up his residence in Washington co., Penn., near Bethany, in western Virginia, which afterward became his home. For a short time he was pastor of a Presbyterian church, from which order he soon separated on the ground that the Bible should be the sole creed of the church. In 1810 he and his father organized a new society at Brush Run, Penn. In 1812 he became convinced that immersion was the only mode of baptism; and he and his congregation were immersed. They united with a Baptist association, but still protested against all human creeds as a bond of union in the churches. He and his followers in time were excluded from fellowship with the Baptist churches, and in 1827 began to form themselves into a separate organization, which extended in the states of Virginia, Tennessee, and Kentucky. In 1864 they numbered 850,000 members. In 1823 Mr. Campbell commenced the publication of the "Christian Baptist," afterward merged in the "Millennial Harbinger," which became the recognized organ of the sect. In 1840 he founded Bethany college, of which he continued to be president to the close of his life. Besides his numerous articles in the "Harbinger," he was the author of several books, among which are "The Christian System," "Remission of Sin," and "Memoirs of Thomas Campbell," his father. He was also engaged in several public discussions, which have been printed. Among these are: with the Rev. John Walker, a Presbyterian (1820); with the Rev. William McCalla on "Christian Baptism"

(1823); with Robert Owen on "The Truth of Christianity" (1828); with Archbishop Purcell on the "Infallibility of the Church of Rome" (1836); and with the Rev. N. L. Rice on "Christian Baptism, the Expediency of Creeds," &c. (1843). On the subject of slavery Mr. Campbell maintained that the institution was sanctioned, or at least tolerated in the Bible, and that therefore the relation of holder of slaves should not be made a test question for communion in the church. His life has been written by Robert Richardson (2 vols., Boston, 1868). (See DISCIPLES.)

CAMPBELL, Archibald. See ABBOTT, DUKE OF.
CAMPBELL, Sir Colin, Lord Clyde, a British general, born in Glasgow, Oct. 20, 1792, died at Chatham, Aug. 14, 1863. He entered the military service in 1808; served in Portugal and at Walcheren; was wounded on several occasions during the peninsular war; served in the war with the United States, in 1814 and 1815; aided in 1823 in quelling an insurrection at Demerara; was actively engaged in the Chinese war of 1842; in the second Punjab campaign, under Lord Gough, in 1848 and 1849, commanded a division of infantry at the battles of Chillianwallah (where he was wounded) and Guzerat, and in other engagements; assisted afterward in the pursuit of Dost Mohammed and the occupation of Peshawar; held the command of the troops in that district; undertook in 1851 and 1852 various successful operations against the tribes of the adjoining mountain regions; and received on his return to England the thanks of the British parliament, and of the East India company, for his services. In 1854 he proceeded to the Crimea in command of the Highland brigade, which took a conspicuous part in deciding the battle of the Alma, Sept. 20, 1854. At Balaklava, Oct. 25, the Russian cavalry were repulsed by his Highlanders. In 1856 he became inspector general of infantry, and held this office until the end of June, 1857, when, on the death of Gen. Anson, he proceeded to India to assume the supreme command in Bengal, arriving at Calcutta Aug. 14. Considerable additions to the army having begun to arrive in the course of October, Sir Colin hastened to Lucknow, the seat of the sepoy rebellion. He reached Benares Oct. 31, crossed the Ganges Nov. 11, and arrived at Alumbagh on the evening of the 12th. After an encounter with a body of 2,000 rebels, he left one of his regiments in garrison at that place, and resumed his march on the 14th; was received on his approach (Nov. 16) by the fire of the enemy, whom he routed, and advanced against Secunderbagh, a walled enclosure carefully loopholed. A narrow breach was effected, enabling the British forces to make terrible havoc among the enemy, 2,000 of whom were killed. On the following day the mess house was taken, the troops bursting into the enclosure round the Pearl Palace, where the rebels made a last stand, and soon a communication was opened

with the residency, permitting Havelock and Outram to welcome their deliverers the same afternoon. Sir Colin, however, recognized at once the impossibility of holding Lucknow in the face of the overwhelming masses of the enemy; but masking his real designs by opening a fire on the Kaiserbagh, he succeeded in dividing the insurgents' attention, and while they were preparing for the anticipated assault the garrison withdrew during the night of the 22d, through the lines of pickets. Toward the afternoon of the 24th Sir Colin reached Alumbagh, where on the 25th he was joined by the rear guard under Sir James Outram (Havelock having died on the same day), and hastening on toward Cawnpore, arrived at the Pandoo Nuddee, within a few miles of that town, on Nov. 26. He came in time to save the British from destruction. A force of 14,000 sepoys, with numerous cavalry and 40 pieces of artillery, was threatening an army of 2,000 Europeans under Gen. Windham. Forced to retire within their intrenchments, the British suffered severely from the fierce assault of the rebels, and were almost entirely at their mercy when, alarmed by the long-continued sounds of firing, Campbell crossed the Ganges, and soon drove the enemy before the intrenchments, capturing 16 of their guns. His first care was to have the women and children and the wounded sent under safe escort to Allahabad, whence they were forwarded to Calcutta; and turning his attention next to the enemy, he commenced the attack in the forenoon of Dec. 6, shelling them out of the town, falling on them with his infantry, and forcing them to take for safety to the Ganges, whence they reached the other side, on their flight into Oude. He again defeated the enemy at Futtehghurh, Jan. 2, 1858; and he recaptured Lucknow, March 4. He was made general, May 14, 1858; created a peer with the title of Baron Clyde, of Clydesdale, Aug. 16; received the thanks of parliament in 1859; and was made colonel of the Coldstream guard in 1860, knight of the Star of India in 1861, and field marshal, Nov. 9, 1862.

CAMPBELL, George, a Scottish clergyman, born at Aberdeen, Dec. 25, 1719, died April 6, 1796. He was educated at Marischal college, and studied law, but afterward devoted himself to theology. He was ordained over a parish near Aberdeen in 1750, presented in 1756 to one of the churches in Aberdeen, elected in 1759 regent of Marischal college, and made doctor of divinity by King's college, and chosen in 1771 professor of divinity in Marischal college. In 1763 he published a "Dissertation on Miracles," in reply to Hume, and in 1776 "The Philosophy of Rhetoric." He also published a translation of the Gospels, which was well received. His posthumous "Lectures on Ecclesiastical History" were marked with a violent feeling of opposition to episcopacy. On the occasion of his resignation, in 1795, he received a pension of £300 a year from the government.

CAMPBELL, John, a political and historical writer, born in Edinburgh, March 8, 1708, died in London, Dec. 28, 1775. His parents removed to Windsor in his childhood. He was intended for the law, but became a writer in the departments of biography, history, politics, and statistics. His first publications were anonymous, and appeared in the following order: "The Military History of Prince Eugene and the Duke of Marlborough" (2 vols. fol., London, 1736); "Travels and Adventures of Edward Brown, Esq." (1739); and "Concise History of Spanish America" (1741). In 1742 he began to put his name to his works; the first was the "Lives of the British Admirals," &c. (4 vols., 1742-'4; increased to 8 vols., 1812-'17). In 1745 he became one of the principal contributors to the *Biographia Britannica*. In 1750 he published a "Survey of the Present State of Europe." After the peace of Paris, 1763, he was employed by the British government to write a vindication of it. His last work was "A Political Survey of Great Britain" (2 vols. 4to, 1774). In 1755 he was appointed agent for the province of Georgia, which office he retained till his death.

CAMPBELL, John, a Scottish clergyman, born in Edinburgh in 1766, died April 4, 1840. He was apprenticed to a goldsmith and jeweller in Edinburgh, but when about 23 years old entered the ministry. He undertook the charge of 24 young Africans who had been brought from Sierra Leone to be instructed in Christianity. He took an active part in the formation of the British and foreign Bible society in 1804, and was ordained the same year pastor of the Kingsland dissenting church, near London. In 1812 he made a journey to South Africa, to inquire into the religious state of the natives, and the prosperity of the missions among them, and repeated the visit in 1818. On his return, each time, he published an account of his travels and observations; and he was the author of several other works. In 1823 he founded the magazine called the "Teacher's Offering," having previously established the "Youth's Magazine," which he edited for 18 years.

CAMPBELL, John, lord, a British jurist and author, born near Cupar, in Scotland, Sept. 15, 1779, died in London, June 23, 1861. His father was minister for 54 years at Cupar. John, the 2d son, was educated at the university of St. Andrews. He went early in life to London, entered as a student at Lincoln's Inn (1800), and was called to the bar in 1806. While pursuing his legal studies, he supported himself by writing law reports and theatrical criticisms. His industry and talents soon brought him a good practice at the common law bar; nevertheless he found time to publish reports of the principal cases decided in the courts of king's bench and common pleas. In 1827 he received the appointment of king's counsel. In 1830 he was returned to parliament for the borough of Stafford, and in 1832 for Dudley. In November of the latter

year he was appointed solicitor general by the Grey ministry, which office he retained till February, 1834, when he became attorney general. He left office with the Grey ministry in November, 1834, and at the ensuing general election was returned for the city of Edinburgh, which he continued to represent till his elevation to the peerage. After the resignation of Sir Robert Peel's ministry in 1835, Sir John Campbell regained the attorney-generalship, which he held till June, 1841, when he was appointed lord chancellor of Ireland, and raised to the peerage as Baron Campbell. On the resignation of the Melbourne administration, September, 1841, he lost his chancellorship. From this period till 1846 his public life was confined to hearing appeals in the house of lords and on the judicial committee of the privy council, and acting as one of the leaders of the opposition in the upper house. His leisure was devoted to literary pursuits, the results of which were: "Lives of the Lord Chancellors and Keepers of the Great Seal of England from the earliest times to the reign of George IV." (7 vols., London, 1846-'7); and "Lives of the Chief Justices of England, from the Norman Conquest to the death of Lord Mansfield" (2 vols., 1849; vol. iii., continuing the series to the death of Lord Tenterden, 1857). The return of the liberal party to power in 1846 gave him the post of chancellor of the duchy of Lancaster, and a seat in the Russell cabinet. On the retirement of Lord Denman from the chief justiceship of the queen's bench in March, 1850, Lord Campbell succeeded him; and from 1859 till his death he was lord chancellor. His speeches at the bar and in the house of commons were published in 1857.

CAMPBELL, Sir Nell, a British officer, born about 1770, died in Sierra Leone, Aug. 14, 1827. He served in the West Indies, became colonel of Portuguese infantry, and took part in the peninsular campaigns against the French. He was subsequently attached to the Russian army to report upon its force and military operations, and was appointed by the British government a commissioner to accompany Napoleon from Fontainebleau to Elba. He subsequently served under the duke of Wellington in Flanders till the second entry into Paris. In 1815 he was sent to explore the course of the Niger, and in 1826 was made governor of Sierra Leone.

CAMPBELL, Thomas, a British poet, born in Glasgow, July 27, 1777, died in Boulogne, France, June 15, 1844. His father was a cadet of the ancient clan of Campbells in Kirnan. At the age of 18 he entered the university of Glasgow, where he remained for six years, partially supporting himself by private teaching. He excelled particularly in Greek, and his translations from the Greek tragedians were considered the best that any pupil in the university had ever produced. On leaving the university he spent a year in Argyleshire, where he composed several poems, among which was "Love and Madness." Unwilling

to enter any of the learned professions, he went to Edinburgh, proposing to devote himself to literature, and there composed "The Pleasures of Hope" (1799). This poem achieved an almost unparalleled success, and introduced the author at once to fame and society. He thus obtained the means to visit the continent, studied Greek several months at Göttingen under Heyne, witnessed from the monastery of St. Jacob the battle of Hohenlinden, which he has described in his letters and in one of the finest of his poems, and after making brief and irregular rambles, controlled by the exigencies of war, being checked in his attempt to pass into Italy, and chased into Yarmouth by a Danish privateer, repaired in 1801 to London. He soon after directed his course to Edinburgh by sea, and was surprised to learn from the passengers that the author of "The Pleasures of Hope" had been arrested in London for high treason, was confined in the tower, and expected to be executed. In fact, so suspicious was the British government at that time, that it had amplified his association with French officers abroad into a plot, and a warrant was issued for his apprehension as a spy. It was with difficulty that the poet on arriving at Edinburgh could satisfy the authorities of his loyalty. During his travels he had composed a few short pieces, among which were his "Exile of Erin," "Lochiel's Warning," and "Ye Mariners of England," but now obtained his livelihood only by fugitive articles for the newspapers and booksellers. He removed in 1808 to London, and soon after to Sydenham, where for 17 years he devoted himself to fulfilling contracts with publishers, and to composing the few poems which confirmed and increased the reputation which his first work had procured him. He had a wife, mother, and sisters dependent on him, and amid alternate seasons of energy and lassitude, hope and despondency, composed an elaborate historical notice of Great Britain for the "Edinburgh Encyclopædia," a "History of the Reign of George III.," frequent contributions to the "Star" newspaper, and collected materials for his "Specimens of the British Poets." Upon the accession of the whigs to power in 1806 he received a pension of £200, and in 1809 published his second great poem, "Gertrude of Wyoming," to which were attached several powerful lyrics. In 1812 he lectured on poetry at the royal institution; in 1814 visited Paris in company with Mrs. Siddons; in 1818 travelled in Germany; and on his return to England assumed the editorship of "Colburn's New Monthly Magazine," which he retained for ten years. His poetical labors from this time, with the exception of the "Last Man," are of little importance. His "Theodric," published in 1824, was pronounced inferior to his former poems, and his "Pilgrim of Glencoe," which appeared in 1842, was deemed a failure. He originated the project of the London university, which, chiefly through his ex-

ortions, was at length successfully established; he was chosen in 1826 lord rector of the university of Glasgow, to which office he was twice reelected; and in 1831 he started the "Metropolitan Magazine." He was severely stricken in 1831 by the capture of Warsaw and the total defeat of the Poles, the objects of his youthful enthusiasm; and domestic calamities came to complete his desolation. "My wife is dead, my son is mad, and my harp unstrung," was the account which he gave of himself; and, with his delicate constitution broken, he found himself a prematurely old man, alone in the world. Yet he remained busy to the last, composed biographies of Mrs. Siddons and of Petrarch, travelled in Algeria, visited Germany again, and in 1843 removed to Boulogne, which he resolved to make his future residence. There he died, after a lingering sickness. Though he chastened his style to simplicity with laborious care, and polished his verses till they accorded with a fastidious and Greek taste, yet most of his lyrics and many portions of his two longest poems appeal to the popular mind and feeling, and are treasured in the memory like primitive songs and ballads.

CAMPBELL, Lord William, the last royal governor of South Carolina, died Sept. 5, 1778. He was the third brother of the fifth duke of Argyll, and in 1763 married a wealthy Carolina lady, sister of Ralph Izard. He was a captain in the navy, member of parliament in 1764, governor of Nova Scotia from 1766 to 1773, and in 1775 of South Carolina. He was active in fomenting insurrectionary movements favorable to the crown among the border population and the Indians, for which he was expelled from the country by the patriots, and took refuge on board a British man-of-war. In this vessel he threatened the city of Charleston, but the guns of Fort Johnson forced him to retreat. He joined the expedition under Sir Peter Parker against the province, and in the attack on Charleston in 1776 received the wound of which he died two years afterward.

CAMPBELL, William, an officer in the American revolution, born in Augusta, Va., in 1745, died in the camp of Gen. Lafayette, at Yorktown, in 1781. He held a captain's commission in the Virginia line, among the earliest troops raised in that state. In 1778 he became lieutenant colonel of the Washington county militia, and soon afterward colonel. After the battles of King's mountain and of Guilford, in both of which he greatly distinguished himself, he was promoted by the Virginia legislature to the rank of brigadier general. He joined Lafayette to oppose the invasion of Cornwallis, but died before the surrender at Yorktown.

CAMPBELLTOWN, a seaport and royal borough of Argyllshire, Scotland, on the E. coast of the peninsula of Cantire, 38 m. W. of Ayr; pop. in 1871, 6,628. It has many distilleries and malt kilns, and the inhabitants are extensively engaged in the herring fishery. Steamship lines connect it with Glasgow and with Ireland.

CAMPE, **Joachim Heinrich**, a German author and publisher, born at Deensen in 1746, died in Brunswick, Oct. 22, 1818. He studied theology at Helmstedt and at Halle, in 1778 was appointed chaplain in the Prussian army, and afterward became a teacher. In 1787 he was chosen by the government of Brunswick to superintend and reform the schools of that duchy. He became the head of a publishing house there, which issued his numerous works, and was afterward conducted by Vieweg, his son-in-law. Campe published *Briefe aus Paris* (1790) and a German dictionary (1807-'11), but his reputation rests upon his numerous books of travel, and other books of instruction for the young. The 21st edition of his *Entdeckung von Amerika* was published in 1869. His *Robinson der Jüngere*, an imitation of De Foe's "Robinson Crusoe," was first published in 1779; in 1870 77 editions in German had been printed, and the work had been translated into most European languages. Both these books have also been translated into Hebrew. His biography by Hallier was published in 1862.

CAMPEACHY, or **Campeche**. I. A state of the Mexican republic, occupying the southern portion of the peninsula of Yucatan; area, 26,090 sq. m.; pop. according to a recent census about 90,000, a large proportion of whom are Indians. It is watered by the rivers San Francisco, Champoton, and some other streams, all of which are small and unimportant; and there are a few small lakes. The soil is in general sandy, except in the forest regions and in the vicinity of the capital; and there are some good pasture lands which support numerous herds of cattle, deer, &c. The chief productions are salt, rice, and sugar; and the industry is confined to the preparation of the fibres of the pita plant (*agave Americana*), here called *jenequea*, which grows in prodigious quantities in all parts of the state. II. A city, capital of the state, and the principal seaport of Yucatan, on the W. shore of the peninsula, on the bay of Campeachy, and at the mouth of the river San Francisco, in lat. 20° 5' N. and lon. 90° 16' W., 550 m. E. of the city of Mexico; pop. nearly 19,000. The streets are irregular, and the houses are remarkable for their uniform height (one story), their square form, and for being all built of a sort of limestone abundant in the neighborhood. Campeachy was founded near the middle of the 16th century; its site has since been twice changed, the present one being honeycombed with subterranean chambers, the handiwork of the Mazas Indians, ruins of many of whose structures are still visible in the vicinity. It was sacked by the British in 1659, suffered much by the pirate Lewis Scott in 1678, and by filibusters seven years later. It is surrounded by walls, behind which rise in amphitheatre a succession of hills. The city has two churches, a number of convents, a museum in which are preserved some curious aboriginal relics, a theatre, several colleges and primary schools, and a public pleasure ground

or park (*alameda*) embellished with alleys of orange trees and with seats of native marble. Living is high at Campeachy, as compared with the other large towns of the peninsula, and the inhabitants suffer for lack of fresh water, most of the springs being brackish. The port, or more properly roads, is defended by three fortresses. Though favorably situated, it is so extremely shallow that few of the numerous vessels which frequent it can approach the mole constructed for that purpose. Vessels drawing 10 feet of water have to anchor more than a mile from shore; and those drawing 15 feet, from 6 to 7 m. off. The commerce of Campeachy, so flourishing in former days, under the Spanish colonial system, when it had the monopoly of the imports to Yucatan, is now confined to the export of salt, sugar, wax (from stingless bees), tafia, hides, deer skins, and articles made from the textile fibres of the pita plant, which, with cigars, form almost the exclusive industry of the inhabitants. But the principal article of export is the famous logwood (*palo de Campeche*), which, however, has considerably diminished of late years, while that of cigars has increased. These are for the most part made of Tabasco tobacco, superior to that of Yucatan, and often sold in foreign markets for the Havana. The value of the imports from the United States in 1870 was \$59,056 12; and the receipts of the custom house in 1871 amounted to \$139,839 92. The climate is in general salubrious, the heat being modified by the cooling breezes of the morning and evening; but yellow fever still appears whenever a number of unacclimated foreigners sojourn in the city.

CAMPEGGIO, Lorenzo, an Italian cardinal, born in 1474, died in Rome, July 19, 1539. He was educated for the law, married young, and upon the death of his wife took holy orders. He was appointed by Leo X. governor of Parma, and was despatched to Germany to combat the progress of Luther. Upon his return he was made cardinal, and was soon after sent to England to induce that country to join the confederation against the Turks. His mission failed in its main object, but he was made by Henry VIII. bishop of Salisbury. On his return he was again sent as legate to the diet of Nuremberg, accredited with full powers to check or uproot Lutheranism. When Henry VIII. determined upon a divorce from Catharine of Aragon, Campeggio was again sent to England to hold a legate court, in connection with Cardinal Wolsey, in which to judge the matter. The appeal of the queen to the pope caused Campeggio to return to Italy, where he assisted in the coronation of Charles V. at Bologna, and upon the death of Pope Clement VII. he used his influence successfully in the conclave for the election of Alexander Farnese (Paul III.). Campeggio was the friend of Erasmus, Sadolet, and other learned men of his time; but of his numerous writings only a collection of Latin "Miscellaneous Letters" (fol., Basel, 1755) has

been published.—There have been six other Italian prelates of this name.

CAMPENON, François Nicolas Vincent, a French poet, born in Guadeloupe, March 29, 1772, died at Villeneuve-sur-Corbeil, near Paris, Nov. 24, 1843. Early in the revolution he composed a romance in praise of Marie Antoinette, and was compelled to flee to Switzerland; he published in 1795 a fanciful account, in prose and verse, of his journey. After his return to Paris he published in 1800, his *Épître aux femmes*, and soon afterward a didactic poem entitled *La maison des champs*. Two years later appeared his *Enfant prodigue*, which had an immense success, and occasioned his nomination and election to the French institute, to succeed Delille. He translated into French Robertson's "History of Scotland."

CAMPER, Pieter, a Dutch physician and anatomist, born in Leyden, May 11, 1722, died at the Hague, April 7, 1789. He studied medicine at Leyden, and in 1748 travelled through England, France, and Switzerland, visiting museums and collections of art, and competing for the prizes offered by academic and scientific bodies. In 1749 he was appointed professor of philosophy, medicine, and surgery at Franeker; in 1755 professor of anatomy and surgery, and in 1758 of medicine, in the Athenæum of Amsterdam, which position he resigned in 1761. In 1763 he became professor of medicine, surgery, anatomy, and botany at the university of Groningen. In 1773 he resigned this chair, and some time after he was named a member of the state council of the United Provinces. He received prizes from the academies and societies of Paris, Dijon, Lyons, Toulouse, Harlem, and Edinburgh; and was member of those of Berlin, St. Petersburg, London, Göttingen, and Paris. His scientific discoveries were numerous. In 1761 he discovered that the hollow bones of birds are in direct communication with the respiratory organs. Gabbé had already observed that these bones contained no marrow, and he surmised that this peculiarity was a condition of stability; but Camper showed that the air of the lungs, penetrating into these cavities of the bones, subserved a special purpose in rendering the body specifically lighter as a means of rising in the air, and enabling the bird to fly. In 1774 Jole Hunter made the same observation, and described this peculiarity in the anatomy of birds; and hence many English anatomists ascribe the discovery to him, which really belongs to Camper. He was one of the earliest ethnological students who attempted to illustrate the varieties of the human race. He makes the shape of the skull the basis of classification, and explains the characteristic form and expression of countenance from the facial angle. He was the first who gave a correct description of the osteology of the rhinoceros, the dugong, and many other animals of different types, giving an impetus to the study of comparative anatomy. He pointed out the analogies which link

together the whole chain of vertebrated animals, men, apes, quadrupeds, birds, reptiles, and fishes. He published separate dissertations on several medical topics, together with a series of memoirs for different learned societies. Among the principal of these are essays on inoculation for smallpox; on the origin and color of negroes; on the signs of life and death in new-born infants; on the causes of infanticide and suicide; on the intromission of air into the lungs of new-born children; and on the operation of lithotomy. In 1808 a collection of his works was published at Paris, in 3 vols. 8vo, with a folio atlas of plates.

CAMPHAUSEN, Wilhelm, a German painter, born at Düsseldorf, Feb. 8, 1818. His specialty is battle pieces, and in order to familiarize himself with such subjects he served as a volunteer in the army. His first productions, "Tilly at Breitenfeld" and "Prince Eugene at Belgrade," were successful. Among his works are "Godfrey de Bouillon at Ascalon," "Puritans watching the Enemy," "A Convoy of Prisoners of Cromwell's Camp," "Storming of an English Castle by the Soldiers of Cromwell," "Charles II. on his Flight from the Battle of Worcester," and "Charles I. at Naseby." In 1859 he became professor of historical painting at the academy of Düsseldorf.

CAMPHENE (a contraction of *camphogen*, from *camphor* and Gr. *γεννν*, to produce), a name commonly applied to purified oil of turpentine, but which is also the generic name for the volatile oils or hydrocarbons, isomeric or polymeric with oil of turpentine. Most of them are isomeric, consisting of $C_{10}H_{16}$, as oil of turpentine, oil of lemons, oil of juniper, the more volatile part of oil of bergamot, caoutchine, &c.; some, as colophine, appear to consist of $C_{10}H_{14}$. Many of the camphenes exist ready formed in plants, and are sometimes contained in natural oils associated with oxygenated compounds from which they may be separated by practical distillation. All the camphenes are liquid at ordinary temperatures, except Berthelot's, which melts at 114° F., with an average density of 0.8 to 0.9; oil of parsley, however, being slightly heavier than water. Their boiling points range from 811° to 329° F. A few boil at higher points, as oil of copaiba, 482° ; petroleum, 536° ; and metaterebene, at about 680° . Camphenes are distinguished from each other by their odors, some of which are very fragrant, while others are disagreeable; and also by their influence on polarized light, some turning the plane of polarization to the right, others to the left. Oxygen is readily absorbed by the camphenes and converted into ozone. Chlorine, bromine, and iodine decompose them with evolution of heat, these bodies taking the place of a portion of the hydrogen, by which reaction the adulteration of other volatile oils with camphenes may be detected. A camphene may yield several isomeric modifications when treated with different acids, or by repeated

treatment with the same acid. Such modifications are called camphenes of the second order, or campherenes. Another class are of the third order, called camphilenes, and are obtained by acting on the hydrochlorates of camphenes with lime or baryta at high temperatures. The following is a list of some of the principal camphenes: oil of bergamot, oil of lemon, oil of hops, neutral oil of cloves, oil of pepper, oil of savin, oil of parsley, oil of gomart, oil of copaiba, oil of elemi, petroleum, caoutchine, thymene, toluene, oil of turpentine. The purified oil of turpentine, or camphene of commerce, is obtained by distilling the oil over quicklime, which separates the resin. It has been much used for purposes of illumination, but its employment is attended with danger. For complete combustion it requires a large supply of air, because of the great proportion of carbon. When burned in a properly constructed lamp it yields a brilliant light. Mixed with three times its volume of alcohol, it forms the "burning fluid" which at one time was extensively used in lamps having long safety tubes. Both of these preparations have been almost entirely superseded by kerosene or refined petroleum.

CAMPHOR, the name given to different concrete volatile products, commonly obtained by distillation from the chipped wood, roots, and leaves of certain aromatic plants, and condensed by sublimation into a solid form. As known in commerce, camphor is procured only from Japan and the islands of Formosa, Sumatra, and Borneo; but one species of the trees which produce it is said to abound in some parts of China. In Sumatra and Borneo the product is limited to a narrow range between the equator and lat. 8° N. Two kinds are known in commerce, the consumption of one of which is monopolized by the Chinese, who, by a mere whim, set a value upon it from 70 to 100 times the price of the other variety. The kind they so highly esteem is the Malay article, the product of a gigantic tree, *dryobalanops camphora* or *aromatica*, which grows wild on the slopes of the Dirimountains in Sumatra, and in the territories of the sultanate of Brunai in Borneo, which attains a height of more than 100 ft., and a diameter of 6 or 7 ft. Siebold describes one which measured 50 ft. in circumference. The camphor is obtained from this tree without employing the process of separation required in procuring the other variety. It is found in concrete masses secreted in longitudinal fissures and crevices in the heart wood, and is extracted by splitting the trunk in pieces and picking out the lumps with a pointed instrument or the nail, when they are small. Some lumps have been found as large as a man's arm, but the product of a large tree does not often reach 20 lbs.; half this amount is a good yield for a middling-sized tree, and in hunting for one many are felled and split up with great labor that furnish no camphor;

hence the high price of the article. The Chinese, it is said, pay for it at the rate of \$1,000 to \$1,200 the picul (133 lbs.), or for a very superior quality even \$3,000 for 1 cwt.; while the Japan article obtained in their ports, and hence known as Chinese camphor, is worth only from \$12 to \$15 the picul. The camphor-wood trunks are supposed to be made of the wood of this tree. It answers well for house and ship timbers and articles of furniture, especially such as are intended to contain and preserve clothes. It is very easy to work, splits readily, and is never attacked by the many destructive insects of the East, which will so speedily devour any European woods, and even those of the East, except the teak, the calambuco, and the camphor. The young trees produce, instead of the full-formed camphor, a straw-colored fluid, which is called in the East Indies the oil of camphor, and is used as an external application in rheumatic complaints. This is supposed by Dr. Thompson to be the same substance as the solid product, the composition of which he represents by the formula $C_{10}H_{16}O$. But the genuine oil of camphor he describes as the product of the same trees which furnish the camphor of European commerce. This is known in this country and in Europe as the camphor of Japan or common camphor; and of this two varieties are recognized in commerce: one, the Dutch, Japan, or tub camphor; and the other, the Chinese or Formosa camphor. The latter is principally produced in the island of Formosa, and thence carried in junks to Canton. There it is packed in square chests lined with lead, and distributed to the various eastern ports at which we obtain it. It is a crude article in dirty gray grains, agglutinated together in



Camphora officinarum.

lumps, and contaminated with many impurities. The tub camphor is obtained in Batavia, whence it is exported in tubs securely covered with matting, and an outside tub, and con-

taining 100 lbs. or more. This is in pinkish-colored grains, coarser and purer in general than the Chinese. Both varieties are probably obtained from the same tree, the *leucas camphora* of Linnaeus, or *camphora officinarum* of Nees von Esenbeck, an evergreen of considerable size, resembling the linden tree, and bearing a red berry like that of the cinnamon. All parts of the plant possess the odor of camphor, and produce this article when cut into small pieces and distilled. The process is conducted in large kettles of iron, which are furnished with covers in the form of a dome, in which stalks of rice or grain are placed for receiving the camphor sublimations. But little water is used, and only a moderate heat applied to volatilize this and the camphor together. The latter condenses upon the straw.—All the camphor of commerce is a crude article, which requires purification before it is fit for use. The art of refining it was long monopolized in Europe by the Venetians, and afterward by the Dutch; and it is not long that we have in this country been independent of the latter for our supplies of the pure material. The crude article is introduced together with about $\frac{1}{4}$ the quantity of quicklime into vessels of cast iron, which serve as retorts, and over which are placed covers of sheet iron connected with the lower vessels by a small aperture. A number of these stills are placed in a large sand bath, and, after the melting of the camphor within them, kept at a uniform temperature, that the process may go on quietly. The quicklime serves to retain the moisture, which would otherwise interfere with the condensation of the pure camphor. This takes place under the shelf upon which the cone stands, the vapor when in excess passing into the loosely affixed cones of sheet iron, care being taken to keep the hole open. The deposit of camphor is in the form of a circular cake an inch or two thick with a hole through the centre.—The composition of camphor is represented by the formula $C_{10}H_{16}O$. Its specific gravity is 0.987; its melting point is 288° F.; and it boils at 400°. It is a semi-transparent white substance, crystallizing in hexagonal plates, and with a crystalline fracture; soft, friable, and tough, so that it is difficult to reduce it to powder. When moistened with a few drops of alcohol, it is easily pulverized. Its taste is somewhat bitter and pungent, attended with a slight feeling of coldness; its odor is strong and fragrant, highly penetrating, and exceedingly noxious to troublesome insects. Exposed to the air, it soon disappears in vapor; in close vessels it sublimates and crystallizes upon the parts most exposed to the light. It is readily inflamed, and burns with much smoke and light. A singular effect is noticed on dropping small pieces of clean camphor upon the surface of pure water. The particles rotate and move rapidly about, sometimes for several hours. Any greasy matter touching the water will at once put a stop to the motions. This phenomenon has been shown

to be due to the giving out of a thin film of camphor upon the surface of the water, and the consequent reaction upon the fragment which is its source. Mr. Tomlinson states that he has found the same phenomenon in the raspings of cork steeped in sulphuric ether, in sublimated benzoic acid, potassium, &c.—Camphor is readily dissolved in alcohol, this taking up about its own weight of it; indeed, 100 parts, of sp. gr. 0.806, dissolve 120 of camphor, forming the camphorated spirit of the pharmacopœias. Water added to the solution precipitates the camphor in fine powder. It is soluble in water only to the extent of about 1 part in 1,000. Chloroform is a powerful solvent of it.—In medicine camphor is made use of internally and externally. In small doses it increases the activity of the heart, stimulates the cerebral functions, and may produce transient giddiness and headache. In larger doses it at first diminishes and then increases the rapidity of the pulse, the giddiness is much increased, while delirium and convulsions as well as partial loss of consciousness have been observed. The effects are usually not of long duration, and some observers have taken considerable doses (Trousseau, 35 grains) with much slighter effects than those described. Fatal poisoning, death taking place by coma, is said to have occurred in one case, a girl, from ten grains. Camphor is used as a nervous stimulant in low forms of fever, also in diarrhœa, cholera, and catarrh. The tincture is used as a domestic remedy in headache and other nervous affections. It has some reputation as a sedative to the genital organs. Dissolved in olive oil, or as recently proposed in chloroform, it forms an excellent liniment.

CAMPHORIC ACID. When camphor is decomposed by the action of strong nitric acid and several times distilled, an acid is obtained of the above name, in fine transparent plates or needles, the composition of which is represented by the formula $C_{10}H_8O_4 + HO$.

CAMPHUYSEN, Dirk Rafelk, a Dutch painter, theologian, and poet, born at Gorkum in 1586, died at Dokkum, July 9, 1627. At an early age he distinguished himself by his landscapes, which were generally of small size, but animated with huts, cattle, and human figures, and executed with a skill and delicacy to which no former Dutch painter had attained. His paintings are now very rare, for at 18 years of age he abandoned the art to devote himself to theology. He embraced the doctrines of Arminius, and shared in the persecutions under which Arminianism then suffered. He was expelled from the curacy of Vlienten, and became a fugitive from village to village, until at last he found a resting place at Dokkum. His poems, which are mostly short, evince much originality and depth of feeling. They have been often reprinted in the original language, and have been translated into German. He translated into Dutch the Psalms of David.

CAMPI. **I. Giulio,** an Italian painter, born in Cremona about 1500, died in 1572. He was a pupil of Giulio Romano at Mantua, and studied the works of Raphael, Titian, and Correggio. Establishing himself at Cremona, he attempted to combine the excellences of the northern Italian and Roman schools, whence he was called the Ludovico Carracci of Cremona, although he conceived the idea of an eclectic style previous to the establishment of the school of the Carracci. His most considerable works were executed at Milan, Cremona, and Mantua. He painted in a free and vigorous manner, and was a fair colorist. **II. Bernardino,** a kinsman of the preceding, born at Cremona in 1522, died about 1590. He was the scholar and eventually became the rival of Giulio Campi. His chief work is a prodigious composition in the cupola of St. Gismundi at Cremona, representing an assemblage of all the blessed of the Old and New Testaments, which he completed in seven months.

CAMPIAN, Edmund, an English author and theologian, born in London in 1540, died Dec. 1, 1581. He studied at Oxford, and was ordained as deacon in the Anglican church. When Queen Elizabeth visited Oxford in 1566, he was selected to make the oration before her, as formerly while at school he had been chosen to deliver an oration before Queen Mary on her accession. He went to Ireland, wrote the history of that country, and connected himself with the Roman Catholic church. Endeavoring to make proselytes to his new faith, he was seized and imprisoned; but after a short time he effected his escape to the Low Countries, and soon after joined the English college of Jesuits at Douai, passed his novitiate as a member of that society, and became distinguished for his piety and learning. At Rome, in 1578, he was admitted a member of the society of Jesus, after which he resided for a time at Vienna, where he composed a tragedy, which was received with much applause and acted before the emperor; and at Prague, where he taught rhetoric and philosophy for six years. Afterward he was sent by Gregory XIII. on a mission to England, where, on his arrival at the beginning of 1581, he challenged the universities and clergy to dispute with him. His efforts were followed by so many conversions as to disquiet the ministry of Elizabeth, and he was arrested and thrown into the tower upon charge of having excited the people to rebellion, and of holding treasonable correspondence with foreign powers; he was tried, found guilty, condemned to death for high treason, and executed at Tyburn. The insults of the populace attended him to the tower, where torture was fruitlessly applied to extort from him a confession of treason or a recognition of the supremacy of the English church, and after his death a fragment of his body was sent to each of the principal towns for exposure. Besides his history of Ireland, he compiled a "Universal Chronology," and wrote *Narratio*

de Divortio Henrici VIII. A volume containing his orations, letters, and *De Imitatione Rhetorica* was published after his death (Ingolstadt, 1602). His life has been written by the Jesuit Paul Bombino (Mantua, 1620).

CAMPLI, a town of Italy, in the province of Teramo, 80 m. N. E. of Rome; pop. about 7,000. It contains a cathedral, an abbey, and three collegiate churches.

CAMPOBASSO. I. A province (formerly Molise) of S. Italy, bounded N. W. by Chieti, E. by Foggia, S. by Benevento, and S. W. by Caserta; area, 1,777 sq. m.; pop. in 1872, 863,948. It comprises the three districts of Campobasso, Isernia, and Larino. It is throughout mountainous, the highest point, Monte Miletto, attaining a height of 6,740 ft. At the lower course of the Biferno is the small plain of Larino. The Biferno is the most important river. The province has several manufactories of steel and iron ware. The soil is in general not so fertile as in the other provinces of southern Italy; among the principal products are grain, wine, and vegetables. II. The capital of the province, situated upon a mountain, 55 m. N. N. E. of Naples; pop. about 14,000. It has a cathedral, four churches, several convents, a lyceum, gymnasium, theatre, hospital, almshouse, and a ruined castle. It is the central mart for the grain trade of the province, and enjoys some reputation for its cutlery.

CAMPOBASSO, *Niccolò*, count of, a Neapolitan soldier of fortune of the latter part of the 15th century. He belonged to a noble family, but his estates were confiscated on account of his having joined the house of Anjou in its warfare against Naples. After their defeat he sold himself to their enemy Charles the Bold, duke of Burgundy, for whom he raised a considerable army of Italian and Dalmatian mercenaries. He subsequently betrayed Charles, going over to René II., duke of Upper Lorraine, and aiding in the defeat of the Burgundians before Nancy, Jan. 5, 1477; and he was suspected at the time, though unjustly, of having been accessory to Charles's death. Campobasso figures in Sir Walter Scott's "Anne of Geierstein."

CAMPO FORMIO, *Campoformio*, or *Campo Formido*, a village of N. Italy, province of Udine, on the canal of Roja, 55 m. N. E. of Venice; pop. about 1,600. A treaty of peace between France and Austria, terminating Gen. Bonaparte's campaigns in Italy, was concluded here Oct. 17, 1797. (See BONAPARTE, NAPOLEON, vol. iii., p. 39.)

CAMPO SANTO. See CEMETERY.

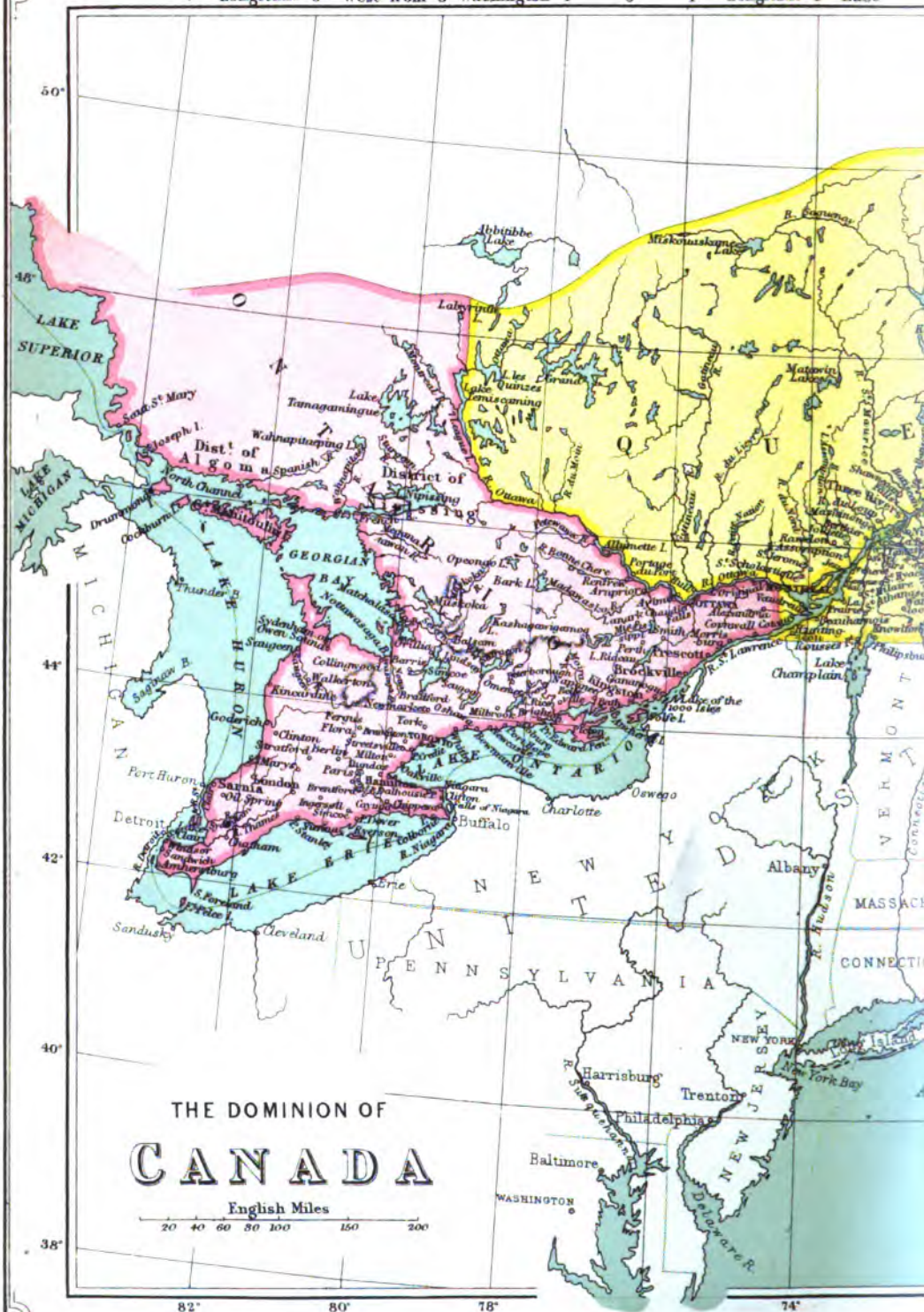
CAMPUS, in Roman antiquity, a common public park, or vacant space near the city for shows, combats, exercises, and similar uses. Ancient Rome possessed eight *campi*. The term is derived from the ancient Sicilian word for race course. The Campus Martius was the most celebrated of the *campi* of ancient Rome. It lay outside of the walls of Rome, and consisted of the level ground between the Quirinal, Capitoline, and Pincian mounts, and the river

Tiber. It received the appellation *Martius* from its being consecrated to the god Mars. It was originally set apart for military exercises and contests. Here the *comitia centuriata* assembled in mass meeting, and subsequently the *comitia tributa*; here stood the *villa publica* for the use of the Roman magistrates and the foreign ambassadors, who were not permitted to enter the city limits. It gradually became a suburban pleasure ground, and was laid out with gardens, shady walks, baths, a race course, and theatres. Julius Caesar built there marble halls for the *comitia*, Agrippa erected the first public baths and the Pantheon, Augustus Caesar the Egyptian obelisk and his own mausoleum, and Statilius Taurus the first amphitheatre of stone. Under the later emperors the place became crowded with public buildings, and subsequently with private residences. Among the former, the most celebrated were Domitian's temple of Minerva Chalcidia, and the pillar of Antoninus. Under Aurelian, the Campus Martius was enclosed within the city boundaries. Campo Marzo is the name given to one of the districts of modern Rome on the northern part of the old Campus Martius.—The Campus Sceleratus, or polluted field, was a place beyond the walls of ancient Rome, where vestal virgins who had been untrue to their oaths of chastity were buried alive.

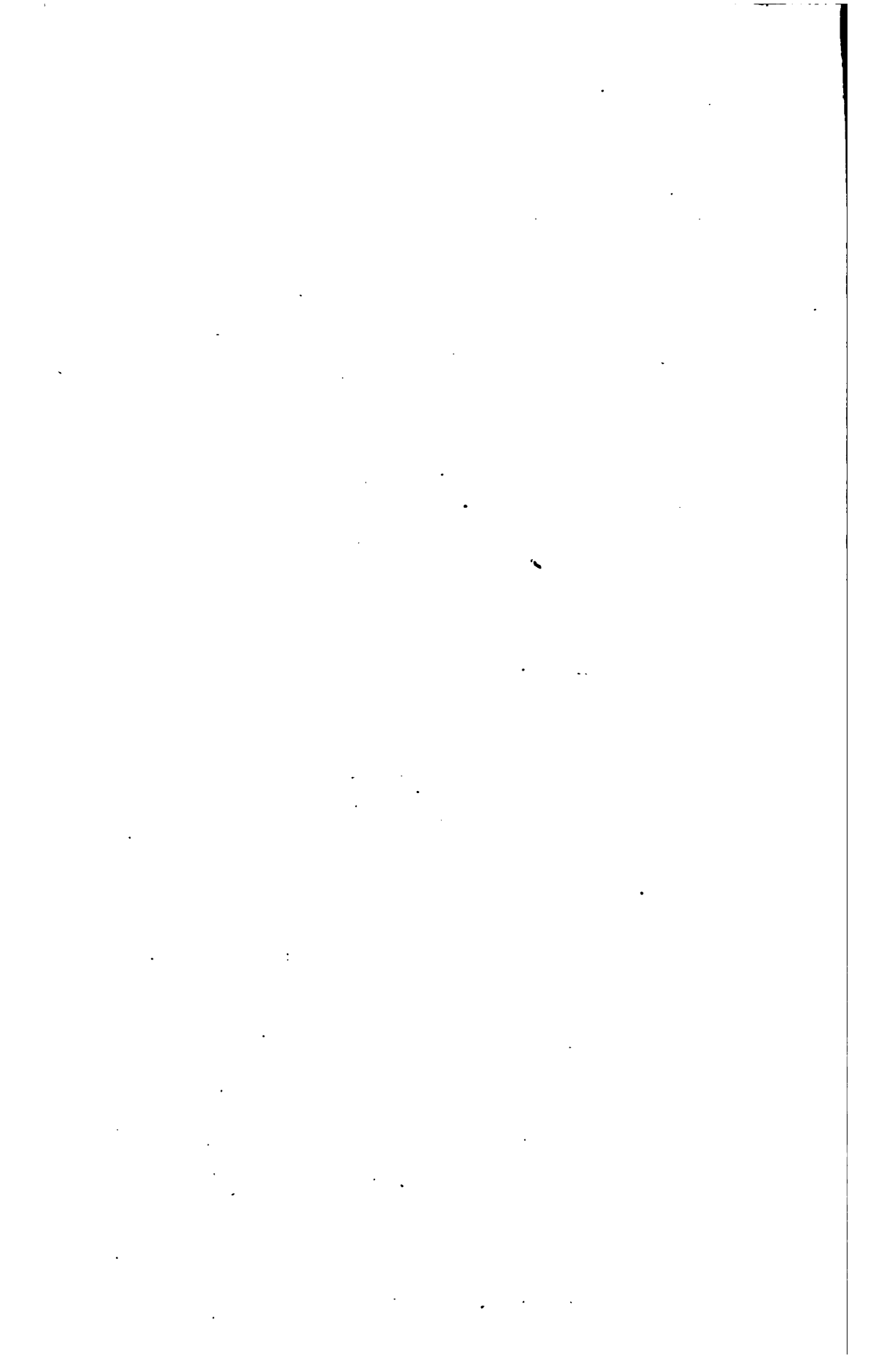
CAMUS, *Armand Gaston*, a French revolutionist, born in Paris, April 2, 1740, died Nov. 2, 1804. He studied law, and was chosen by the French clergy as their advocate general. In 1789 he was elected a member of the states general, and took an active part on the revolutionary side. When Mirabeau went over to the king, he was vigorously opposed by Camus. After the flight of Louis XVI. to Varennes, Camus accused the king, Lafayette, Montmorin, and Bailly of conspiracy and treason, and insisted upon the suppression of all orders and corporations based upon hereditary claims. As conservator of the national archives Camus did good service in preserving the documents belonging to the suppressed corporations. In 1792 he was elected to the national convention, where he proposed a bill impeaching the ministers for treason and embezzlement, and urged the confiscation of the estates of the emigrants and of convents. In December of that year he was sent to Belgium as commissioner to watch the movements of Dumouriez and his colleagues, and so was not present at the trial of Louis XVI.; but he forwarded his vote in favor of death, without delay or appeal. In March, 1793, he was one of the commissioners appointed to arrest Dumouriez and his colleagues, but he and his four associates were seized by Dumouriez and handed over to the Austrians. After an imprisonment of 2½ years he was exchanged for the duchess of Angoulême, daughter of Louis XVI. Returning to France, he became a member of the council of 500, of which he was chosen president, Jan. 23, 1794. He resigned in May following, and thereafter



0 1° Longitude 3° East







devoted himself to literary pursuits. True to his republican principles, he voted, July 10, 1802, against the law appointing Bonaparte consul for life. He wrote *Histoire des animaux d'Aristote* (1788), *Voyage dans les départements nouvellement réunis* (1808), and several legal works.

CAMUS, Charles Étienne Louis, a French mathematician and mechanician, born at Crécy-en-Brie, Aug. 25, 1699, died in Paris in 1768. He was a professor of geometry and examiner in the schools of engineering and artillery in Paris. In 1736 he accompanied Maupertuis and Clairaut in their expedition to Lapland to measure a degree of the meridian there, and was afterward employed in the same work between Paris and Amiens. His papers in the memoirs of the academy are generally on mechanical subjects, and are of great value. He also published a *Cours de mathématiques* (4 vols. 8vo, Paris, 1749), and *Opérations faites pour mesurer le degré de méridienne entre Paris et Amiens* (8vo, 1757). In 1760 he became perpetual secretary of the academy of architecture.

CANWOOD, a red dyewood, principally imported from the vicinity of Sierra Leone, ob-

reanean on the W., the Jordan on the E., the desert of Shur on the S., and Syria on the N., and was originally inhabited by descendants of Canaan, the son of Ham. (See PALESTINE.)

CANADA, Dominion of, a semi-independent federation of British provinces, occupying the northern part of North America, bounded N. by the Arctic ocean, E. by the Atlantic, S. by the United States, and W. by the Pacific ocean and Alaska. Its southernmost part is in lat. 45° N., and it lies between the meridians of 53° and 141° W. The superficial area is greater than that of the United States, and is nearly equal to the whole of Europe. It comprises the following provinces and territories: Ontario, 121,260 sq. m.; Quebec, 210,020; Nova Scotia, 18,670; New Brunswick, 27,087; British Columbia, 238,000; Manitoba, 16,000; Hudson Bay and Northwest territories, 2,206,725, exclusive of Labrador and the islands in the Arctic ocean. These being added, the total area is about 3,500,000 sq. m. Of this amount more than half is the property of the general government, acquired by purchase from the Hudson Bay company. The portion which is useless for cultivation from being subject to summer drought is



Camwood (*Baphia nitida*).

tained from a leguminous tree, called by De Candolle *baphia nitida*. The coloring matter is with difficulty imparted to water, cold or boiling. Alcohol and alkaline solutions readily extract it. It is usually kept in the ground state.

CANA, the name of two ancient towns in Palestine, one, now Kana el-Jelil, about 8 m. N., the other, Kefr Kenna, about 8 m. N. E., of Nazareth. It is uncertain which of these, if either, is the scene of the first miracle of Jesus, as recorded in the New Testament. Dr. Robinson gives the preference to the first mentioned Cana. Stanley, in his "Sinai and Palestine," thinks the claims of the two about equally divided.

CANAAN (Heb. *Kena'an*, probably lowland, from *kana'*, to incline), that part of the promised land which lay between the Mediter-



Seal of Canada.

50,000 sq. m.; the prairie lands, with occasional scattered groves and belts of timber on the margin of rivers, well adapted for agriculture, cover 120,000 sq. m.; the timbered lands, in which occasional prairies are interspersed, as in the Peace river district, and which are suitable for the growth of wheat and other grains, cover 466,225 sq. m. There is a belt of land, comprising 928,200 sq. m.; lying outside the prairie and timbered portions, which, though beyond the agricultural zone properly speaking, is sufficiently supplied with timber, and may be utilized for the growth of barley and grass. Rock and swamp, in which the timber of the more southern regions gradually disappear, occupy 642,300 sq. m. In other terms, we may set down 875,184,000 acres of agricultural land, yet to be brought under cultivation, outside the limits of the organized provinces, the greater

part of which is well adapted to the growth of wheat. The population in 1861 was 3,090,561; in 1871 it was 3,906,810, exclusive of Indians in the Northwest and Hudson Bay territories, distributed as follows: Ontario, 1,620,842; Quebec, 1,191,505; Nova Scotia, 887,800; New Brunswick, 285,777; Manitoba, 13,000; British Columbia, 35,586, including Indians. The nationalities comprised were 1,082,940 French, 846,414 Irish, 706,869 English, 549,946 Scotch, 202,991 German, 29,622 Dutch, 23,035 Indian, 21,496 African, 7,778 Welsh, 2,962 Swiss, 1,623 Scandinavian, 1,035 Italian, 879 Spanish, 607 Russian, 125 Jews, and 39 Greeks. There were 1,492,029 Roman Catholics, 494,049 belonging to the church of England, 567,091 Methodists, and 544,998 Presbyterians; also 5,146 not professing religion, 1,886 pagans, 534 Mormons, 409 deists, 20 atheists, and 13 Mohammedans.—The Dominion of Canada does not include any portion of Labrador (which belongs politically to Newfoundland) east of a line drawn due N. of Anse au Sablon, near the extremity of the strait of Belle Isle, to lat. 52° N. In the gulf of St. Lawrence it includes the Magdalen islands, but leaves out Prince Edward island, which belongs to it geographically, and probably will soon politically. The boundary line passes through the straits of Northumberland N. of New Brunswick and Nova Scotia in the form of a semicircle, with the two ends reaching upward in equal distance, the northern extremity of Prince Edward island, on its western part, extending precisely as far N. as the extreme northern portion of Cape Breton, lat. 47° 4' N. After enclosing Cape Breton it sweeps round Nova Scotia proper in a S. W. direction. On the N. side of this province the line of boundary leaves on the Canadian side Grand Menan with its islands in the bay of Fundy, and Campo Bello, Deer, and Indian islands in Passamaquoddy bay, while the minor islands S. and N. W. are on the United States side. From the mouth of the St. Croix, in Passamaquoddy bay, to its source, the line of boundary was run and marked by commissioners of England and the United States, under the treaty of 1794, by whom a monument was placed at the source of the St. Croix; thence the exploring line ran N., and was marked by the surveyors of the two governments, under the treaty of Ghent, in 1817 and 1818, to its intersection with the St. John river; this was adopted by the Ashburton treaty of 1842. Thence it was continued up the middle of the stream to the mouth of the river St. Francis; up the middle of that river and the lake through which it flows to the outlet of the Pohemagamook; thence S. W., by the shortest direct line, to a point on the St. John supposed to be ten miles from the main branch of the latter river; but if it proved to be less than seven miles from the summit of the highlands that divide the waters which flow into the St. Lawrence from those which fall into the St. John, the point of junction was to re-

cede down the N. W. branch of the St. John to a point seven miles in a straight line from the summit; thence it took a direct course about S. 8° W. to a point where the parallel of 46° 25' N. intersects the S. W. branch of the St. John; thence southerly along that branch to its source in the highlands at Metjarmette portage; then down the highlands which divide the waters that fall into the river St. Lawrence from those that fall into the Atlantic ocean, to the head of Hall's stream, and down the middle thereof to the intersection of the old boundary line, long presumed to be identical with the parallel of 45°. From St. Regis the line runs 35° 0' 45" W. into the river, at right angles to the shore, to within 100 yards of Cornwall island; thence it is carried in a westerly direction, as near as was found physically possible, through the middle of the St. Lawrence river, Lake Ontario, the Niagara river, Lake Erie, the Detroit river, the lake and river St. Clair, into Lake Huron, in which the line was so run as to give St. Joseph's island to Canada and Tammany islands to the United States. It then turns easterly and northerly round the lower end of St. George's or Sugar island, and follows the middle of the channel which divides St. George's from St. Joseph's island; thence up the Nabaish channel, near St. George's island, through the middle of Lake George; thence W. of James island into St. Mary's river to a point in the middle of the river about a mile above St. George's island, which it secures to the United States; thence through that river and Lake Superior to a point marked by the commissioners under the treaty of Ghent N. of Isle Royale, 100 yards N. and E. of Isle Chapeau, near the N. E. point of Isle Royale; thence S. W. through the middle of the sound between Isle Royale and the N. W. mainland to the mouth of Pigeon river; up that river to and through the N. and S. Fowl lakes, to the height of land between Lake Superior and the Lake of the Woods; thence along the water communication to and through Lake Seiganga; thence to Cypress lake, Lac du Bois Blanc, Lac la Croix, Little Vermilion lake and Lake Mamican, and through the smaller lakes, straits, and streams connecting with these, to a point on Lac la Pluie or Rainy lake, where the commissioners under the treaty of Ghent traced the line to the most N. W. point of the Lake of the Woods, in lat. 49° 23' 55" N. and lon. 95° 14' 38" W.; then due S. till it intersects the parallel of 49° N., and along that parallel, nearly 1,200 in., to the Pacific. This latter portion of the boundary line is now in course of settlement by means of a joint survey.—The most striking physical features of Canada are the Rocky mountains, the Laurentian range, with its continuation northward to the Arctic ocean, and the immense bodies of fresh water, especially in the northern part of the country, which have so great an effect on the climate. The range to which the name of the Laurentian mountains has been given runs

along the N. bank of the St. Lawrence river, near its margin, from the Labrador coast to Cape Tourment, near Quebec. From this point the range recedes N., running 60 m. behind Quebec and 30 m. behind Montreal. Thence, following the line of the Ottawa for a distance of 150 m. from Montreal, it crosses that river at Lac du Ohat; then taking the opposite direction, it returns S. to the St. Lawrence, a little below the point at which Lake Ontario discharges its waters into that river. From this point it runs in a N. W. direction to the S. E. extremity of Georgian bay; then forming the E. shore of that bay, it passes beyond to lat. 47° N.; whence, taking a W. direction, it passes Lake Superior, and runs in a N. W. direction to the Polar sea. This range crosses the St. Lawrence at the point where it returns to it after crossing the Ottawa; and the Thousand Islands, which there stud the former river, may be considered as so many of its fragments. Between this point and Lake Champlain it comprises the Adirondack mountains. On the S. side of the St. Lawrence, commencing near the E. extremity at Gaspé, is another range of mountains, which is considerably broken, running parallel with the river, and passing higher up through the Green mountains of Vermont into the higher range of the Alleghenies, which divide the waters of the Ohio from those of the Atlantic. On the river Chate one of the peaks has an elevation of 3,768 ft. The Laurentian series of mountains, on the N. side of the St. Lawrence, have at some points an elevation of from 4,000 to 5,000 ft. This elevation is attained between Quebec and Lake St. John; but this is at a point where the rivers, including the Jacques Cartier, are 3,000 ft. above the level of the St. Lawrence, and in general the range is much lower. The height of land which divides the affluents of the St. Lawrence from those of Hudson bay is far from presenting a continuous mountain range. It consists for the most part of a ridge of table land, on which the sources of the waters which run N. and S. interlock and overlap one another, sometimes for considerable distances. At some points the heights have now been ascertained by actual survey. At the W. end of Portage du Prairie, above Lake Superior, the elevation is 1,520 ft. above the level of the sea. The ridge decreases in height eastward. The highest point in the peninsula of Ontario, along the line of the Great Western railroad, is about 700 ft. above Lake Ontario. A line surveyed on the plateau of Lake Erie shows an elevation of only 200 ft. at the highest point above Lake Ontario. The altitude of the valley of the Red river is about 680 ft. above the sea level.—Viewing the country as a whole, Canada may be said to be open on the Atlantic and the Pacific, and the whole widely extended northern frontier of the United States, with which it is coterminous; for where the dividing line is not hydrographical, there are scarcely any natural boundaries. On the north the country

is closed by the Arctic sea and practically inaccessible. The river St. Lawrence, which brings down the waters of six lakes (for to the five on the frontier Nipigon in the north must be added), is the great natural entrance and outlet of the country. This river is navigable for sea-going vessels as far as Montreal, a distance of nearly 600 miles. Above Montreal several extensive rapids occur. They can be descended by the largest steamers which navigate Lake Ontario; but as no force of steam is sufficient for their ascent, it has been necessary to construct canals, near the sides of the river, to overcome them. These canals, with that intended to overcome the falls of Niagara—the Welland—have been constructed at a cost to the province of \$15,000,000, the whole of them having been directly built as government works. By the aid of these canals, and that constructed at the Sault Ste. Marie, between Lakes Huron and Superior, vessels may descend from the head of the latter lake into the ocean; and as a matter of fact, several vessels have gone from Chicago, on Lake Michigan, to Liverpool; but it is a question if this combined lake and ocean navigation will ever become general. The Saskatchewan, which takes its rise in the Rocky mountains and empties into Hudson bay, through Lake Winnipeg and the Nelson river, is about 1,800 m. long; but from the interruptions to navigation near its mouth, and the high latitude in which it lies, it is only the upper section, or Saskatchewan proper, that is valuable for navigation. The Mackenzie, which has a course over 10° of latitude, has the disadvantage of connecting with the Arctic ocean.—Canada has not the same varieties of climate that some countries of much smaller extent enjoy; but the distribution of large bodies of fresh water saves it from the evils of aridity and sterility. The St. Lawrence and the connecting lakes above are estimated to contain 12,000 cubic miles of water. Besides these, there are thousands of lakes in Canada further north, some very large and others of which the size is only very imperfectly known. The region of summer droughts lies between the parallel of 49° and Bow river, the S. branch of the Saskatchewan; at the base it extends between the meridians 104° and 114°, rounding off in a cone-like shape on the north, with its apex about the meridian of 108°. The northern extremity of the chief wheat zone, commencing in the east at the parallel of 50°, on the N. side of the St. Lawrence, near its mouth, is deflected a little to the south, when it reaches as far W. as James's bay; it then takes a general N. W. course till it strikes the parallel of 60° at its intersection with the meridian of 101°; from which point to the Pacific it has the form of a bow slightly bent northward, both ends of which rest on the parallel of 60°. The northern limit of grains and grasses, crossing James's bay in lat. 52°, takes a N. W. course till it attains to nearly 70°, at the meridian of 132°. The wheat zone covers 1,300,-

000 sq. m.; that of the grasses and coarser grains, 2,800,000 sq. m.; of maize, 500,000 sq. m. The summer isothermal of 70° , starting at Long island, lat. 41° , and passing through Pittsburgh, Cleveland, and Chicago, rises in its westward course, on the Saskatchewan, to lat. 52° , at the meridian of 110° ; that of 62° , starting off Boston, crosses the Red river in lat. 50° , lon. 97° , and rises to 60° at Mackenzie river. —The valley of the St. Lawrence is a region of immense forests of coniferæ and deciduous trees. Whatever may be the effect of these forests in producing precipitation, they certainly prevent evaporation, retaining the moisture in the ground and keeping the rivers and springs constantly supplied. Over the whole of this valley up to 49° the sugar maple is found; the ash-leaved maple on the Saskatchewan in 54° ; and wherever the maple is found it has the wild vine for a companion. The Canadian forests comprise 60 different trees. The black walnut, now becoming scarce, attains an average height of 120 feet. —The government of Canada is modelled in some respects after that of the United States, but in others wholly differs from it. The constitution is embodied in an imperial act, known as "the British North American act, 1867;" it received the royal assent on March 29 in that year. The passage of this act took place at the express desire of the provinces interested. The immediate reason for a change was that the old union between Upper and Lower Canada had become unsatisfactory. Based as this union was upon an equality of suffrages, without regard to relative population, the increasing preponderance of Upper Canada, carrying with it no corresponding increase of political power, made itself felt in discontent with the existing political condition. When it became manifest that Lower Canada would not consent to an increase of the representatives of Upper Canada, under the then existing legislative union, the upper province sought a remedy in a change of the relations of the provinces to one another, and to those adjoining but not united to them. The initiative was taken in 1864 by the parliament of Canada, a secret committee of the legislative assembly being appointed to inquire into the political condition of the provinces, and devise a remedy for the evils complained of. The proceedings of that committee have never been divulged. Scarcely had it concluded its labors when the two political parties, hitherto separated by an antagonism which every year tended to make more acrimonious, united with the avowed object of bringing about a federal union of the whole of British America, from the Atlantic to the Pacific, with Prince Edward Island and Newfoundland, the latter of which, in the colonial system, is not considered part of British America. Delegates were appointed by the governments of Canada, Nova Scotia, and New Brunswick to arrange a basis of federal union. Prince Edward Island and Newfoundland

refused to coöperate; and the great majority of the people of Nova Scotia, far from sanctioning the action of their government, displayed an almost revolutionary violence in their opposition. Threats of resorting to arms were sometimes uttered. When the basis of union had been agreed upon at the Quebec conference of delegates, it was submitted to the several legislatures for ratification. In Upper Canada there was no opposition; in Lower Canada opposition was confined to the usual political minority, relatively very small; in New Brunswick confederation, after a struggle, commanded a large majority; in Nova Scotia the consent of the legislature was not obtained. Delegates were now appointed by the governments of the several provinces to carry this basis of union to England and get it embodied in an act of the imperial parliament. That parliament would probably have refused to do violence to the wishes of any province; but it was induced to believe that the question of confederation had not been an issue at the previous general election in Nova Scotia. To the united provinces the name of "the Dominion of Canada" was given. At the start the confederation included four provinces: Ontario, Quebec, Nova Scotia, and New Brunswick. British Columbia has since been brought in, and the whole of the Hudson Bay territory purchased and annexed. The executive authority is nominally vested in the queen of England; and the governor general, the only officer in the Dominion who receives his appointment from the British government, carries on the government in her name. With the sole exception of the pardoning power, the authority of the governor is exercised under the advice of a privy council, appointed and removable by himself, with the approbation and assent of the house of commons. The command of the land and naval militia, and of all naval and military forces, is vested in the queen. Ottawa is the seat of the federal government. The legislative power is exercised by two houses of parliament, styled the senate and the house of commons, in connection with the governor general, whose assent to all acts of parliament is given in the name of the queen. The senate is not a representative body, in the sense of being periodically elected. Its members are nominally appointed by the crown; in fact by the governor general, on the recommendation of the privy council. Under the legislative union of the Canadas, the legislative council, which then formed the second chamber, had for some years been elected by the people. This practice had not prevailed in New Brunswick; and the Quebec conference decided upon going back to the principle of crown nomination. Ontario has 24 senators, Quebec 24, Nova Scotia 12, New Brunswick 12, British Columbia 3, and Manitoba 2. The whole number cannot exceed 78. A senator must be 30 years of age, a natural born or a naturalized subject of the queen, possessed

of freehold property to the value of \$4,000, and an equal amount in personal property, and a resident of the province for which he is appointed. In the case of Quebec, senators are appointed to represent particular districts; and they must either be residents of those districts or have a property qualification therein. The appointments are for life, but a seat would be vacated by bankruptcy or loss of the required property qualification, transfer of allegiance to another country, treason, felony, or any infamous crime. The house of commons originally consisted of 181 members, of whom 82 were for Ontario, 65 for Quebec, 19 for Nova Scotia, and 15 for New Brunswick. Since then 6 have been added for British Columbia, and 4 for Manitoba. There is no fixed date for the annual meeting of parliament; that body is summoned, as in England, by the executive, at convenient times for the despatch of business. The electoral divisions of Quebec (late Lower Canada), Nova Scotia, and New Brunswick remained the same as before the confederation was formed; those of Ontario (late Upper Canada) were somewhat altered. Except for Quebec, which is always to continue to have the fixed number of 65 representatives, there is to be a readjustment of the representation after every decennial census, according to the changed proportions of the population; but no province is to have the number of its representatives reduced unless the decrease of population, as compared with the population of the whole of Canada, reaches 20 per cent. All appropriation and tax bills must originate in the house of commons; and no money vote can be proposed unless it be recommended to the house by message from the governor general. There are certain measures of an unusual or extraordinary kind to which the governor general may refuse the royal assent, and which he may reserve for the signification of the queen's pleasure; and the royal veto may be exercised at any time within two years. Besides the federal government, there is a local government in each province. The lieutenant governors of the provinces are appointed by the governor general, and hold office during pleasure, but are removable only for cause within five years, which is practically the term of their incumbency. They are advised by executive officers, most of whom act as heads of departments, who are responsible to the people's representatives. These governments are not uniform in structure, one of them, that of Ontario, having but one chamber. In the distribution of the powers between the general and the local legislatures, the crown lands remained under the control of the governments of the provinces in which they are respectively situated. To the charge of the general parliament were assigned public debt and property; the regulation of trade and commerce; the raising of money by any mode of taxation; borrowing on the public credit; postal service; census and statistics; militia, military and naval,

and defence; beacons, buoys, lighthouses, Sable island; navigation and shipping; quarantine and the establishment and maintenance of marine hospitals; seacoast and inland fisheries; ferries between a province and any British or foreign country, or between two provinces; currency, coinage, and legal tender; savings banks; weights and measures; bills of exchange and promissory notes; interest; bankruptcy and insolvency; patents of invention and discovery; copyrights; Indians and lands reserved for Indians; naturalization and aliens; marriage and divorce; the criminal law (from which the constitution of the courts is strangely excepted, and the anomaly is seen of local legislatures constituting or altering the constitution of courts to which the general government appoints the judges); the establishment, maintenance, and management of penitentiaries; and all subjects not expressly assigned to the local legislatures. The residuum of power therefore rests with the general legislature, not the provincial. The parliament of Canada has to enact uniform laws relative to property and civil rights in the several provinces, and the procedure of any courts therein; but such laws cannot go into effect until reenacted by the provincial legislatures. The powers confided to the local legislatures are uniform. They include the right to amend the local constitutions, except as regards the office of lieutenant governor; direct taxation to raise a revenue for provincial purposes; to borrow money on the credit of the province; the establishment of the tenure of provincial offices, and the appointment and payment of provincial officers; the management and sale of the public lands and timber; public and reformatory prisons; local hospitals, asylums, and charities, other than marine hospitals; municipal institutions; shop, saloon, auction, and other licenses; local works, exclusive of lines of ocean and other ships, railways, canals, and telegraphs which extend beyond the limits of the province, or, being situated wholly within one province, have been legally declared to be for the general advantage of Canada, or of more than one province; the incorporation of companies for provincial purposes; the solemnization of marriage; property and civil rights; the administration of justice; the enforcing of laws, by punishment, fine, or penalty, having relation to any of the subjects of which the provincial legislature has cognizance; and generally all matters of a local or private nature. Previous to the establishment of confederation, separate Roman Catholic schools had been established in Ontario, and dissentient or Protestant schools in Lower Canada, as part of the public school system; and the continued existence of both is guaranteed by a constitutional prohibition to legislate on the subject. With regard to agriculture and immigration the general and local legislatures have concurrent jurisdiction. The only judges appointed by the local governments are those of the probate courts in Nova

Scotia and New Brunswick. The judges of the courts of Quebec, where there is a million of French-speaking people, must be selected from the bar of that province. The judges of the superior courts hold office during good behavior, but are removable by the governor general on address of both houses of parliament. The salaries, allowances, and pensions of the judges of the courts, except the probate courts of Nova Scotia and New Brunswick, are fixed by the parliament of Canada. Parliament has authority to establish a general court of appeal, of which the powers will be similar to the supreme court of the United States. At present the Dominion government has to pronounce on the constitutionality of acts of the provincial legislatures, before exercising the authority to disallow them. The Dominion assumed the debts of the several provinces to the amount of \$62,500,000; and the residue of the debt of Canada above that amount, not less than \$10,500,000, was assumed by the provinces of Ontario and Quebec, in proportions to be determined by arbitration. Disagreement arising on the results of the arbitration, the question has been (1873) appealed to the privy council in England. Nova Scotia became liable for whatever amount its debts was in excess of \$4,000,000, and New Brunswick for whatever sum its debt might exceed \$7,000,000. The Dominion obtained the customs and excise revenues, and agreed to pay each province an annual subsidy of 80 cents per head of the population, besides a fixed yearly sum for the support of its government: Ontario \$80,000, Quebec \$70,000, Nova Scotia \$60,000, New Brunswick \$50,000. This subsidy, and the lands, minerals, and forests, constitute the actual sources of the provincial revenues; but to them they can, if necessary, add the resort to direct taxation. There is a disposition on the part of the smaller provinces to complain of this fiscal arrangement. To Nova Scotia an additional amount has since been granted. New Brunswick is entitled to receive, in addition to the above amount, \$63,000 a year for ten years. To the existing Dominion debt is to be added \$25,000,000 or \$30,000,000 for the intercolonial railway to connect Halifax with Quebec, sections of which were built many years ago, and the remainder is now in course of construction, and the Pacific railway, the construction of which was one of the conditions of the accession of British Columbia to the union. The contract for this road has been let, government giving \$30,000,000 in money and 50,000,000 acres of land in aid of its construction. The imperial government guarantees a loan of \$12,000,000 for the same purpose. In the division of assets, the Dominion took the canals, harbors, lighthouses, public vessels, river and lake improvements, debts due by railway companies (few of them of any value), military roads, custom houses and public buildings, except those required for the provincial governments,

ordnance property, armories, drill sheds, munitions of war, and lands set apart for general purposes; leaving to the provinces of Ontario and Quebec, conjointly, lunatic asylums, normal schools, some court houses in Quebec, law society buildings, Ontario consolidated loan fund (to which many millions of hopelessly bad debts were due by municipalities), Quebec fire loan fund, educational endowments, and other things of a local nature. The imperial parliament guaranteed a loan of £3,000,000 sterling to build the intercolonial railway, by which means the amount was obtained at four per cent. The loan is repayable by a sinking fund, at the rate of one per cent. per annum.—The revenue for the year ending June 30, 1871, was \$19,829,560, of which more than one half, \$11,841,104, was derived from customs; excise, the next largest item, producing \$3,253,941. The income from public works, including canals and railways, was \$1,146,240; interest on investments, \$554,888; prison labor, \$124,817. The remainder is made up of a number of small items, not one of which reaches \$100,000. At the same date, the outstanding public debt payable in London, was \$75,811,162. It consists of 5 and 6 per cent. securities, and those covered by the imperial guarantee, and bearing a much lower rate. Portions of this debt fall due at various times up to the year 1940. The largest amount that will fall due at one time, \$82,707,095, matures in 1885. The length of railroads in operation is 3,250 m., to which will soon be added 500 m. additional of the intercolonial; and the estimated length of the Pacific is 2,700 m. The telegraph lines are fully 80,000 m. In 1871 there were 420 newspapers and other periodicals published in Canada. Of these 255 were issued in Ontario, of which 24 were daily, 2 tri-weekly, 1 semi-weekly, 195 weekly, 6 semi-monthly, 25 monthly, 1 quarterly, and 1 yearly; 96 in Quebec, of which 12 were daily, 11 tri-weekly, 8 semi-weekly, 51 weekly, 8 semi-monthly, and 11 monthly; 87 in Nova Scotia, of which 3 were daily, 6 tri-weekly, 23 weekly, and 5 monthly; 34 in New Brunswick, of which 3 were daily, 2 tri-weekly, 1 semi-weekly, 24 weekly, 3 monthly, and 1 quarterly.—Canada no longer supplies wooden vessels to Europe, but she yearly builds a large number of ships for home use. During the fiscal year ending June 30, 1872, the total number built was 414, aggregating 114,065 tons; of these 37 were steamers, with 6,408 tons. The number built and registered from 1858 to 1872 inclusive was:

YEARS.	BUILT.		REGISTERED.	
	No.	Tons.	No.	Tons.
1858.....	855	87,330	599	118,492
1860.....	826	96,439	526	134,000
1870.....	839	98,166	494	110,823
1871.....	839	106,101	540	121,724
1872.....	414	114,065	563	127,571
Total.....	1,828	497,001	2,658	559,647

A comparison of the percentage of tonnage contributed by the different provinces shows Nova Scotia to be the largest ship builder:

PROVINCES.	1868.	1869.	1870.	1871.	1872.
Ontario.....	5	6	5	7	9
Quebec.....	81	88	21	30	12
Nova Scotia.....	86	28	86	41	47
New Brunswick.....	28	38	38	39	33

The percentage of registrations for the same period shows where the ships are owned:

PROVINCES.	1868.	1869.	1870.	1871.	1872.
Ontario.....	6	6	6	8	9
Quebec.....	33	81	28	28	20
Nova Scotia.....	42	35	40	39	36
New Brunswick.....	18	28	31	30	35

The tonnage of the vessels that entered inward in 1871 was 6,576,771, and of those that cleared outward 6,549,257. These figures show the Dominion to stand third in the list of maritime powers, only England and the United States possessing a larger commercial marine. The development of this marine is due largely to the extensive fisheries of the gulf of St. Lawrence, the number of Canadians employed in which is estimated at 75,000. The value of the exports in 1871 was \$74,173,618; of the imports, \$86,947,482. The imports from and exports to the United States almost balance one another; the exports being \$30,975,642, and the imports, \$29,022,887. The exports to Great Britain amounted to \$24,173,224, and the imports thence to \$49,168,170; exports to the British West Indies, \$2,104,064; imports thence, \$389,528; exports to the foreign West Indies, \$1,773,334; imports thence, \$2,055,597. The distribution of the imports and exports for two years ending June 30 was as follows:

IMPORTS.

PROVINCES.	1869-'70.	1870-'71.
Ontario.....	\$36,135,176	\$39,025,243
Quebec.....	32,888,916	40,108,120
Nova Scotia.....	3,940,300	9,488,068
New Brunswick.....	6,582,327	8,044,714
Manitoba, half year.....		296,387
Total.....	\$74,814,839	\$86,947,482

EXPORTS.

PROVINCES.	1869-'70.	1870-'71.
Ontario.....	\$24,650,899	\$28,086,585
Quebec.....	37,807,468	39,021,706
Nova Scotia.....	5,306,417	6,516,927
New Brunswick.....	5,306,206	5,517,930
Manitoba, half year.....		80,520
Total.....	\$73,578,490	\$74,173,618

The exports for the year ending June 30, 1871, comprised the following articles:

Produce of mines.....	\$3,231,461
“ fisheries.....	3,994,375
“ forests.....	22,332,311
Animals and their produce.....	12,562,925
Agricultural produce.....	9,858,146
Manufactures.....	2,201,281
Other articles.....	887,554
Ships.....	558,144
Goods not produce of Canada.....	9,853,068
Coin and bullion.....	6,690,850
Short returns.....	2,443,668
Manitoba, three months.....	80,520
Total.....	\$74,173,618

The value of the imports for the year ending June 30, 1872, was \$107,704,895; an increase of over \$20,000,000 in one year. The duties collected on them amounted to \$18,016,218. The value of the exports was \$82,689,668, of which \$12,798,182 represented products of other countries than Canada.—The history of Canada up to 1867 was the history of the two present provinces of Ontario and Quebec alone. In the spring of 1534 Jacques Cartier, or Quartier, as the ancient French historians write the name, a French navigator, under orders from the king, sailed from St. Malo, with two vessels of 61 tons each, and 61 men; at the end of 20 days he reached Newfoundland, and penetrating the strait of Belle Isle, entered the St. Lawrence, having made the discovery of Canada. Entering the Bay of Chaleurs, Cartier took possession of the country in the name of his sovereign, in spite of the protestations of a chief of the race who were the owners of the soil. A large wooden cross was placed on a neighboring eminence, as if to announce the religious mission of the discovering nation. The other principal navigator whose name is connected with Canadian discoveries is Champlain; besides the lake which bears his name, he discovered the lakes Ontario and Nipissing. When colonization was seriously commenced, it was conducted on a plan very different from that pursued in New England. The colony was semi-military, semi-religious. The Recollect and the Jesuit missionaries traversed the country in all directions, enduring incredible hardships to secure the conversion of the Indians. Garrisoned forts were constructed at every prominent point from Quebec to Florida; and those on the shores of Hudson bay were sometimes in the hands of the French and sometimes in possession of the English. The French were frequently at war with the Indians, having for their enemies the Iroquois, the most ferocious tribe that dwelt on the S. side of the lakes. For allies the French had the more timid and less warlike Hurons, who were driven from the peninsula of Upper Canada by the Iroquois in 1686, taking refuge on St. Joseph's island, where numbers of them perished miserably of famine during the winter. The feudal system, on the model of the *Coutume de Paris*, was established; and thus a nobility, who generally possessed nothing but their swords and the land granted to them as *seigneurs*, sprang up on the banks of the St. Lawrence. The seigneurs were

obliged to concede the lands granted to them, when demanded by settlers, on certain conditions. They were not absolute proprietors; but they possessed certain rights in the soil and were obliged to perform certain duties. It was incumbent on them to build mills, and on the *censitaires* to employ these mills; all water power pertained to them; they had a right to charge a nominal rent, which has generally been stated at two sous per arpent; when the *censitaires* sold their improvements and the rights they had acquired in the lands, a portion of the money went to the seigneur. He possessed several other rights of a beneficiary nature, as well as some of a personal kind. This system became ultimately unsuited to the advanced state of society; but it was not till 1854 that the legislature made provision for its abolition, the seigneurs being compensated for the privileges they were called on to surrender. In 1629 Quebec fell into the hands of the English, who were led on by three refugee French Calvinists, whose sect had been formally excluded from the colony. On March 29, 1682, Canada was restored to its ancient mistress by the treaty of St. Germain-en-Laye; but in the interval there had been much discussion in France as to whether the colony were worth receiving back. In 1668 one of the most remarkable earthquakes on record occurred in Canada. It commenced on Feb. 5, and continued, with some short intermissions, over six months. If the accounts of it do not grossly exaggerate, it changed the entire face of the country, causing mountains and rivers to disappear, and forming lakes where mountains had stood before. The fountains were dried up, and the color of the rivers was changed, some of them having their waters tinged with yellow, others with red, those of the St. Lawrence being white as far down as Tadousac. Near Three Rivers two mountains are said to have been precipitated into the St. Lawrence, to have changed its course, and to have given the white appearance to the vast body of water which it contained. Near Tadousac the continuity of the motion was least broken, and at that point a storm of ashes is said to have been driven across the St. Lawrence. The tone of portions of the contemporary narrative gives reason to suspect exaggeration, the more especially as not a single colonist was injured, and none of the houses suffered greater damage than the falling of a chimney. In the infancy of the colony the governors, in connection with the intendant, held the military and civil administration in their hands; and in connection with the seigneurs, who possessed the right of administering justice in their seigneuries, they exercised judicial functions. In time the accumulation of duties rendered it necessary for the governors, of whom there were three, one at Quebec, another at Three Rivers, and a third at Montreal, to perform part of their functions by deputy. Jesuit and other priests became conspicuous in the public service. Afterward,

at the instance of the parliament of Paris, which had supreme control in all the affairs of the colony, the French king established the *conseil souverain de Québec*. Besides acting as a court of appeal when the decisions of the subaltern judges were called in question, the supreme council registered, upon the order of the king, all edicts, ordinances, declarations, letters patent, &c. It was composed at first of the governor, the bishop, five councillors appointed by them every year, and a king's attorney. The intendant was afterward accorded a place in the supreme council, which had power to hold its sittings at Three Rivers, Montreal, or any other place, as well as Quebec. After the appointment of a bishop of Quebec, serious dissensions broke out between the civil and ecclesiastical authorities, victory sometimes declaring for one side and sometimes for the other. Bishop Laval was powerful enough to procure the recall of a governor, and the appointment of a successor of his own selection. The supreme council, on the other hand, reduced the tithes payable by the Roman Catholics from $\frac{1}{4}$ to $\frac{1}{8}$. In 1690 an English fleet, under Admiral Phips, made an unsuccessful attack upon Quebec, and after receiving considerable damage had to retire under cover of a dark night. The establishment of the French colony at Detroit, and the discovery of the Mississippi by La Salle, are among the principal events of this part of the history of Canada. By the treaty of Utrecht, signed April 11, 1713, Louis XIV. restored to England Hudson bay, ceded Newfoundland and Acadie (Nova Scotia), and renounced all right to the Iroquois country, reserving to France only the valleys of the St. Lawrence and the Mississippi. The terms of the treaty were sufficiently vague to give rise to disputes as to the extent of the territories respectively belonging to each country; and as neither country was willing to be confined to the limits which the other wished to assign it, a final struggle for supremacy, extending over a period of seven years, ended by the cession of Canada to England and of Louisiana to Spain in 1763. The conquered colonists were guaranteed the free exercise of their religion, and the right of the Catholic clergy to continue to receive their accustomed rights and dues. Whether the subsequent confiscation of the Jesuits' estates was a violation of this stipulation is a question that has been much disputed. In 1774 the parliament of England passed an act to provide for the government of the province of Quebec, as the new acquisition was then called. By this act the king was empowered to appoint a council of not less than 17 nor more than 23 members, for the government of the colony. Except for public roads or buildings, the council was not empowered to levy taxes, and no ordinance which might pass concerning religion was to be valid till it had received the express approbation of the king. The criminal law of England, which had previously been

extended to the colony, was continued in force. This arrangement continued till 1791, when Canada was by an act of the imperial parliament divided into two provinces, Upper Canada and Lower Canada. To each a popular assembly and a legislative council, nominated by the crown, were given. The crown was empowered to confer hereditary titles upon residents of the colony. The legislature was to meet once every year. The governors, appointed by the crown, might reserve for the pleasure of the sovereign any bill which the legislature might pass. Authority was given to reserve one seventh of the public lands for the support of a Protestant clergy, the apparent intention being to constitute endowments of church of England rectories. For this purpose some 3,400,000 acres were set apart; but very few of them were ever actually applied to the endowment of rectories, the instructions to this effect of the imperial government having been disobeyed; and in 1854 an act of the provincial legislature was passed to devote the whole of these lands to secular purposes. Thus the idea of establishing a state church in Canada was relinquished. Disputes regarding the interpretation of the constitutional act arose. One party contended that Canada was in possession of a transcript of the British constitution, and that the advisers of the governors in matters of state should be responsible to the commons house of assembly. The other party denied the necessity of any accord between the executive council and the legislative assembly. The attempt to make the local government responsible to the popular branch of the legislature was not successful till 1841, the year after an imperial act had been passed to unite the provinces under one administration and one legislature. The definite establishment of a responsible government in 1841 was effected by a series of resolutions passed by the legislative assembly, in which the other chamber was not invited to concur. In this simple manner was consummated a revolution which bears some analogy to that of 1688 in England. But in 1841 victory was already achieved for the principle of constitutional government, before its formal declaration by the resolutions of the popular chamber. The antecedent struggle between oligarchy and the constitutional principle had been long, fierce, and sanguinary. It was marked by open insurrection in 1837 and 1838. The popular complaints which preceded that outbreak were numerous, but they are all referable to the single circumstance of an irresponsible administration. In the rebellion, which had Louis Joseph Papineau for chief in Lower Canada, and William Lyon Mackenzie in Upper Canada, a considerable number of lives were lost; after the failure of the enterprise, some executions took place, many who had been implicated in the movement fled for protection to the United States, and several were banished to the island of Bermuda. There were some serious engagements

between the troops or militia and the insurgents. For some weeks the Upper Canada insurgents had possession of Navy island, situated in the Niagara river, just above the falls. In 1849 a general amnesty was passed. In 1841 Upper and Lower Canada were united for purposes of government. The system of government was professedly modelled after that of Great Britain. In 1849 the parliament houses in Montreal were burned down by a mob, in consequence of a measure proposed by the government to pay certain losses incurred by individuals in the insurrection; and for a period the sessions of the legislature were held every alternate four years in Toronto and Quebec. In 1857 Ottawa was selected as the permanent seat of government. Costly public buildings were erected there; and it continues to be the seat of the general government under the new confederation, the history of which has already been given.

CANADIAN INDIANS. The term *Canadaquois* was applied by the earliest French writers to a tribe on the N. shore of the St. Lawrence, below Quebec, and apparently the tribe now known as *Nasquepees*. When the country obtained the name of Canada the term was generalized, and Brebeuf's "*Huron or Wyandot Ojibemism*" (Rouen, 1680) is called *Canadian*.

CANADIAN RIVER rises near Fisher's peak, among the Sierra Blanco mountains, in New Mexico, about 125 m. N. E. of Santa Fé, and after flowing S. for about 150 m. turns E., passes through portions of Texas and the Indian territory, and enters the Arkansas river about 250 m. from its mouth. Its total course is about 600 m. Although during the dry months it is a shallow stream, the melted snows and ice of spring swell its waters so much that it frequently overflows its banks. The North Fork is its principal tributary.

CANAJOHARIE, a village and township of Montgomery co., N. Y., on the Mohawk river and the Erie canal, 50 m. N. W. of Albany; pop. of the township in 1870, 4,256; of the village, 1,822. It contains a number of churches, a bank, and an academy. There are stone quarries in the vicinity.

CANAL, an artificial watercourse, usually constructed for the passage of boats, although the term is applicable to aqueducts for other purposes, as the first canals of the ancient Egyptians and Assyrians, which were originally designed to supply water for irrigation, but afterward came to be used for navigation. In constructing a canal, a plentiful supply of water being of the utmost importance, it should be carried as nearly as the demands of trade will allow through those portions of a country which contain natural watercourses whose level is above the highest level of the water in the canal, and the most unbroken route will be the means of avoiding expensive structures for carrying the boats across valleys and mountains. The channel is formed with sloping sides, the inclination depending

upon the nature of the soil, and in many situations a covering of stonework is employed. The breadth of the canal at the bottom should be more than twice that of

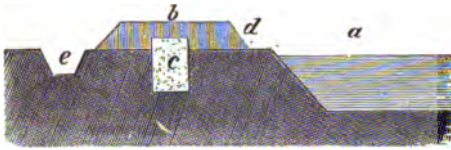


FIG. 1.—Cross Section of a Canal. *a*. Part of the waterway. *b*. Tow path. *c*. Puddling of clay or cement to prevent percolation. *d*. Berme bank. *e*. Side drain.

the boats upon deck, thus securing sufficient room for passing, and the depth should be at least one foot greater than the draught of water of the loaded boats. The tow path, built upon one side, is from 2 to 3 ft. above the level of the water, and from 12 to 14 ft. wide to allow the horses to pass each other with ease. The water that falls upon this should drain outward, and not into the canal; and for receiving this a ditch called a side drain is sometimes constructed outside of the towing path, and another outside of the opposite bank. Where the soil is not retentive, the bottom and sides require to be puddled with clay tempered and well mixed with sand and gravel. This is put on in successive layers of 2 or 3 in. each, as the under layers set. Each layer, however, should be made to unite with the one it is laid upon, by working this up to roughen its surface. The puddling often requires repairs, and these in the colder parts of the country are conveniently made when the water is let out of the canal for the winter. Puddling serves to prevent the burrowing of animals under the canal, by which much mischief is often produced, a small hole rapidly becoming a large one by the flow of the water through it. Even in retentive soils puddle ditches are sometimes sunk in the banks, and filled with cement or clay, to prevent the percolation of water, as well as to intercept the progress of burrowing animals. Between the tow path and the slope there is often a bench from 8 to 5 ft. wide, called a berme. The level of this is a few inches above the surface, and its purpose is to favor the growth of grass and aquatic plants to prevent the washing away of earth, and also to catch earth and stones that may roll from the tow path. Bermes may be constructed on either side of the canal; the bank opposite the tow path is also called the berme bank. The bed of a canal is made so nearly horizontal that the water will flow with a gentle current from one end of a level to replace the water drawn off at the lower end. The levels are the spaces between two locks, each level being at a greater or less elevation than the one adjoining. These changes of level succeed each other rapidly in hilly districts, and they are often so great that several locks are required, one immediately following another like a flight of stairs, in order to over-

come the difference of elevation.—As ordinarily constructed, a lock is a chamber of timber or masonry, long and wide enough to receive the largest boats that navigate the canal. Indeed, the size of the boats is limited by that of the locks. Its bottom reaches to that of the lower level, or pound, as it is called by the English, at the termination of which it is placed, and its top is a little above the surface of the water in the upper pound. Each end is closed by heavy swinging doors, which open in the middle

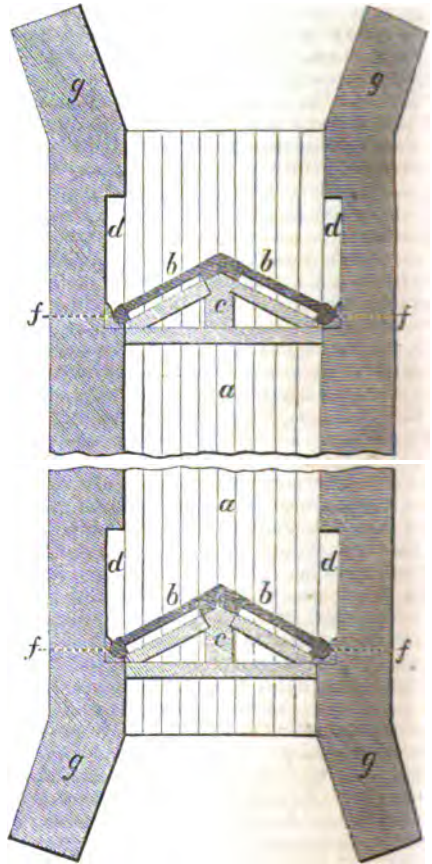


FIG. 2.—Horizontal Section of a Canal Lock. *a*. Lock chamber. *b*, *b*. Gates, with balance beam left off to show the quoins. *c*, *c*. Mitre sills. *d*, *d*. Recesses for the gates to swing into. *f*, *f*. Hollow quoins to receive the quoin posts of the gates. *g*, *g*. Wing walls.

against the direction of the current. The width of the two doors being a little greater than that of the lock, they meet before they form a straight line, and consequently brace against each other, making a close fit when the water presses against them. The upper gates, reaching only to the bottom of the upper pound, are as much shorter than the lower gates as the difference of elevation of the upper and lower level. The gates near their lower end are furnished with sliding valves, which

may be controlled from above, and which serve when opened to admit the passage of water, when the gates are shut and cannot be opened on account of the pressure of the water against them. A lock, aside from the gates, consists principally of three parts. The space included between the gates is called the chamber; the part above the upper gates is the upper or head bay, and that portion below the lower gates is the lower or tail bay. The bottom of the chamber and also of the bays is covered by planks running longitudinally and lying upon cross timbers supported by hydraulic masonry. The chamber is terminated at its upper end by a vertical wall, called the breast or lift wall, because its height is equal to the lift of the levels. It is covered at the top with a framework of timber forming in the middle an obtuse angle, against which the lower ends of the upper gates rest when they are closed. This timber is called the mitre sill, and is represented in fig. 2. Formerly it was sometimes constructed of stone, but this has been found to wear the gates much faster than wood, and also to cost more for construction and repair. A recess called a gate chamber is made at either side in the walls of the head bay, of sufficient depth to allow the gates to swing out of the way of the boat. The posterior curved part of this recess, in which the gate post turns, is called the hollow quoin, and the gate post is called the quoin post, or heel, and is made of a semi-cylindrical form, somewhat eccentric to the curve of the quoin, to facilitate rotation. At a short distance above the upper gate chambers the bay walls are turned outward, sometimes in straight and sometimes in curved lines, forming the wing walls. The chamber walls, immediately above the lower gates, are also provided with recesses, similar to those in the upper bay. The lower gates are of similar construction to the upper, and revolve in quoins in the same manner; and the parallel walls of the lower bay are terminated, like those in the upper bay, by outward-curving wing walls. When a boat in ascending a canal comes to a lock, the lower gates being open, it passes in, and the gates are immediately closed behind it. Water is then allowed to flow through the valves in the upper gates, or

that they can be opened and the boat can pass through upon the higher level. (See fig. 3.) Were another boat to follow in the same direction, the upper gates must be first closed, and the lock emptied through the lower gates. These being then opened, the boat can pass in, and the process be repeated. In this operation there would be a lock full of water discharged to a lower level, which might have been used for letting down a boat had there been one ready to pass in the opposite direction. Hence, when the supply of water is limited, there is economy in passing the boats alternately each way through the locks, besides thus expediting the passage of the greatest number. The common lift of a lock is 5 or 10 ft., though it is occasionally much less, and is sometimes as

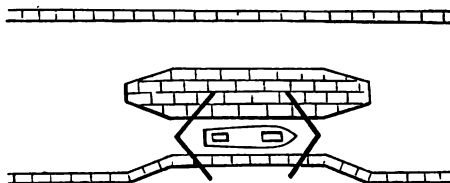


FIG. 4.—Diagram of a Weigh Lock.

great as 18 ft. Where tolls are collected upon the cargo, weigh locks are provided by which the amount of freight is determined by subtracting the known or ascertained weight of the empty boat from the combined weight of boat and cargo. The lock should be situated at a suitable point along a level where the canal is conducted along the side of a hill, to allow of the convenient discharge of water from the lock. The gates at either end are adjusted to open outwardly, like the upper gates of a lift lock. The bottom of the lock consists of a platform which is suspended from a system of levers placed overhead. Tide or guard locks are constructed at the point where a canal enters a river or bay, and the place must be selected with much care.—A bar is usually found at the mouth of an affluent, and when, as is often the case, a canal follows this, its outlet should be placed below the bar. A large basin is generally built at the outlet of the canal, and at the outlet of the basin is constructed a lock with double gates, arranged in such a manner as to allow the boats to be locked up or down, depending upon whether the tide has caused the water to be higher or lower in the river than in the basin. Small streams which are lower than the canal are conveyed under it through ordinary culverts. If the level of the canal is not much above that of the brook, the culvert is given the form of an inverted siphon, and is called a broken-back culvert. When the stream is large the canal is taken across it in an aqueduct. Gates called waste weirs are provided in levels of much length to let off surplus water, and should be located at points where it can be discharged into natural streams. That they may also be used for draining the canal,

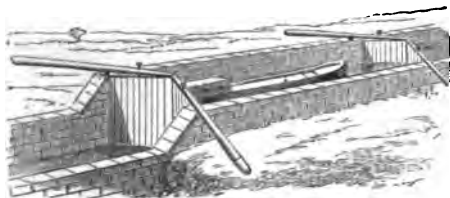


FIG. 3.—Lift Lock.

sometimes through a sluice called a side culvert, discharging from the upper level into the lock. As this fills, the boat is lifted up, and the upper gates are gradually freed, so

they are so constructed that they may be opened at any level between the surface and bottom of the canal. The water is discharged through slide gates which move in grooves. Canals are supplied with water upon their upper levels, to replace what is consumed by evaporation, leakage, and the passage of the boats through the locks. The structures which thus supply water, whether they are built expressly for this purpose, or are also used as

canals for transportation of boats, are called feeders.—In crossing rivers whose levels are below that of the canal, it is sometimes necessary to erect structures which require very skilful engineering. The aqueducts at Schenectady and at Cohoes, by which the Erie canal crosses the Mohawk river, are among the finest pieces of engineering architecture in the country. Fig. 5 is a view of the Seneca river aqueduct, by which that canal is carried



FIG. 5.—Seneca River Aqueduct.

across the Cayuga marshes upon 80 arches of stone masonry resting upon piers 5 ft. in width. The arches are 22 ft. span, with a spring of about 10 ft. commencing 11 ft. above the surface of the water. The width of water in the aqueduct is 53 ft. at the surface. The total length of the structure is 894 ft. The work was commenced in January, 1849, and completed in the spring of 1857, at a total cost of \$200,000. The aqueduct by which the Chesapeake and Ohio canal is carried over the Potomac river is 1,446 ft. long and 36 ft. high. The conduit has a 9-foot vent and discharges 68,000,000 gallons of water in 24 hours. It is supported by 8 piers of granite, which are imbedded 17 ft. in the river bottom. It was constructed from plans made by Major Turnbull of the U. S. topographical engineers, at a cost of about \$2,000,000. The first aqueduct for canals in England was made by the duke of Bridgewater under the direction of James Brindley, across the Irwell. It consisted of three arches, the middle one of 63 ft. span. The aqueduct on the Lancaster canal, over the river Lune, designed by Rennie, is a bold and elegant structure, consisting of five arches, each of 70 ft. span, rising 70 ft. above the level of the river. The aqueduct at Slateford carries the Edinburgh and Glasgow Union canal across the valley of the Water of Leith. The arches and also the water channel are made of cast iron, the latter being built in with masonry. It is about 500 ft. long, and has 8 arches of 45 ft. span each, the canal being 70 ft. above the level of the river. The Pont-y-Cysyllte aqueduct, by Telford, which carries the Ellesmere canal across the Dee and the vale of Llangollen, is celebrated for its magnitude, for the simplicity of its design, and the just proportion of its parts. The water channel is made of cast iron, supported on cast-iron arches which

rest upon stone pillars. The aqueduct is about 1,000 ft. long, consisting of 19 arches, each of 45 ft. span. The pillars are 8 ft. broad at the top, and the height of the four middle ones is 115 ft. to the spring of the arch. The surface of the water in the canal is 127 ft. above the level of the river. In France there are some remarkable aqueducts of masonry. At Dégain and at Guézin, across affluents of the Loire, are structures of this kind respectively 810 and 1,298 ft. long. The aqueduct of the Ganges irrigation canal is probably the largest structure of this kind yet built, it having a waterway of 170 ft. in width by 10 ft. in depth.—The motive power used on canals is various. In China the boats are towed by men, as they were in England on the Thames and Severn till near the close of the last century; but on most European and American canals of small breadth and depth horses and mules are used. On the larger canals, especially in Europe, steam power is used to a great extent. The average rate of towage on the Erie canal is estimated to be less than two miles per hour, and the economical and satisfactory introduction of steam power on this work has long occupied the attention of the state authorities as well as the general public. Perhaps the subject cannot be better set forth than by presenting the views contained in a report recently made by a commission which was appointed by the legislature of New York "to practically test and examine inventions and any and all devices which may be submitted to them, by which steam, caloric, electricity, or any other motor than animal power may be practically and profitably used and applied in the propulsion of boats upon canals." The act which appointed the commission provides that if the commissioners shall determine that one or more "inventions," not to exceed three in

number, shall be found satisfactory "by reason of a new, useful, and economical means of propulsion," it shall then be their duty to grant certificates to the inventors to that effect. The act authorized an award of \$50,000, as follows: If only one was successful, he should receive the whole; if certificates should be granted to two, the first was to have \$35,000, and the second \$15,000; if there were three successful competitors, the first was to have \$30,000, the second \$15,000, and the third \$5,000. It was required that a speed of not less than three miles per hour should be made, that there should be economy in the consumption of fuel and in the transportation of freight, and that no injury should be done to the banks of the canal. At a meeting of the commission in August, 1871, a large number of inventors appeared with models and drawings. The impression was general among them that the principal difficulty to be overcome was the injury done to the banks of the canal by the swell created by the wheels of the boat, and therefore most of the inventions were directed to some new device; and the exhibitors also appeared to have the general idea that some application of steam power hitherto unused was demanded of them. The attorney general was thereupon asked for an opinion, and he returned an answer that the act did not, in the use of the word "new," intend to exclude the application of any form of steam machinery which should be applied to the boats in such a manner as to move them economically both as regarded the boat and the canal, and to meet the tests required. The engineer of the commission, David M. Greene of Troy, expresses the opinion that a speed of three miles per hour can be economically attained, and that it will probably be by the use of the paddle or screw wheel, or some modification. An act passed in 1871 increased the award to \$100,000, and Mr. Greene and a committee have since examined into the use of steam on canals in other states, particularly in New Jersey, of which a report has been published. The committee decided, at a meeting on Feb. 18, 1873, to ask the legislature for an extension of time for making the awards, more time being required by the inventors, as well as for the investigation of claims. It is probable that the proper pitching and laying of slopes with stone work will allow of the use of almost any style of steamboats of suitable dimensions. What is known as the European or Belgian system of steam cable towage has been in use upon canals in France, Belgium, Holland, and Germany for several years, and by some is considered successful. It was first introduced upon the Seine for towing boats between Havre and Paris, where a submerged chain was used, composed of links about eight inches long, and passing round a wheel having cogs which fitted into the links to prevent slipping. A drum has been substituted, and also a wire cable which works with less power. A company obtained a charter

from the legislature of New York in 1870, by which they were given the right to place cables in the bottom of the canals of that state for the purpose of propelling boats by steam power. The plan requires the use of a drum wheel and steam engine upon the boat. The act provided that if the company failed to introduce the system within 18 months after its passage, the right should cease.—The system of irrigation by canals, begun in Chaldea, but afterward extending over nearly the whole of Assyria, was the cause of the wonderful fertility of that country. The royal canal of Babylon, built about 1700 B. C., and reopened by Nebuchadnezzar 11 centuries after, and enlarged to such an extent as to afford passage to merchant ships, was considered by Herodotus one of the wonders of that city. The great canal of China, which connects the Pei-ho with the great central stream of Yang-tse-kiang, 500 m. distant, forms a communication, interrupted only by a narrow interval, that extends from Peking to Canton, a distance of 1,000 m. Unacquainted with locks, they raise or lower their boats from one level to another on inclined planes by the use of capstans. A considerable part of this canal—that between the Hoang-ho and the Yang-tse-kiang—is supposed to have been constructed about the 7th century. In the 13th century canals were first constructed in the Netherlands, and their perfect adaptation to the flat country of Holland caused them to be rapidly extended, till they now connect all its villages, and are used as roads. Amsterdam owes its present commercial prosperity largely to the facilities afforded by its ship canal of 51 m. in length, which connects the river Y by a direct channel with the North sea. This canal, one of the largest works of the kind in Europe, was constructed between the years 1819 and 1825 at an expense of £850,000. Attention was given at an early day to the subject of canals in the Italian states, and the invention of the canal lock is commonly attributed to two of their engineers of the 14th century, although Belidor, in his *Architecture hydraulique*, gives the credit of the invention to the Dutch. Some writers say that Leonardo da Vinci first used locks on the Milanese canals in 1497, and soon after introduced them into France. The latter country has a very complete system of canals. That of Languedoc, called the canal du Midi, was commenced in 1666 and opened in 1681, and was the first canal of any considerable magnitude in Europe. It commences at Toulouse on the Garonne, and, after traversing considerable mountain chains, valleys, and rivers, ends at l'Etang de Thau near Agde. From thence navigation is continued to the port of Cette by the canal of that name, thus uniting the Atlantic and Mediterranean. It is 150 m. long, 60 ft. wide, and 6½ ft. deep, and has 114 locks and sluices; and at the highest point it is 800 ft. above the level of the sea. It cost 17,000,000 francs, and it is said that the collections from

tolls have never equalled the interest on this sum. The most important canal of Germany is the Ludwig's canal, which unites the waters of the Danube with those of the Rhine. Charlemagne conceived the idea of uniting the Danube with the Main by the Altmühl, but the limited engineering knowledge of the time prevented its execution. The enterprise was accomplished by King Louis I. of Bavaria. The work was begun at Nuremberg in 1836, and was many years in construction. The canal commences at Kelheim on the Danube, and makes use of the Altmühl to Diefurt, thence northward to Nuremberg, and thence along the Pegnitz to ship navigation at Bamberg on the Main. It reaches its greatest elevation at Neumarkt, 660 ft. above the surface of the Main and 270 above that of the Danube. It is about 108 m. long, is 54 ft. wide at the surface and 34 ft. at the bottom, and has a depth of 5 ft. It is carried over the Pegnitz by an aqueduct 150 ft. long, and over several other smaller streams. In 1755 the duke of Bridgewater brought forward the project of connecting Manchester with Worsley by a canal; and when this had been successfully accomplished, other works of the same kind were built in such numbers, that before the introduction of railroads it was estimated there were over 2,200 m. of navigable canals in England, besides much slack-water

navigation upon the rivers made use of in connection with canals. South of Durham, it is said, there is not a spot in England 15 miles from water communication. But the introduction of railroads has greatly lessened their importance, and they continue to be used only for the transportation of heavy freight. There are, however, canals in Great Britain and other countries which are intended for the passage of large vessels to ports situated upon arms of the sea or rivers that are not sufficiently navigable, which will always be useful, and will rather increase than diminish in importance.—The oldest canals in the United States are the South Hadley and Montague canals in Massachusetts, both undertaken by a company chartered in 1792. They are short canals for passing through the rapids at South Hadley and the Montague falls, on Connecticut river, the former 2 m. long, with a lift of lockage of 40 ft., and the latter 3 m. long, with a lift of 75 ft. The Middlesex canal, 27 m. long, connecting Boston harbor with the Merrimack at Chelmsford (now Lowell), was completed in 1808. These works are now either abandoned or used only for water power and irrigation. The following table gives the length, dimensions, and cost of construction of the principal canals now in use in the United States, except those of New York, given in another table:

TABLE OF CANALS IN THE UNITED STATES (EXCEPTING NEW YORK).

NAME AND LOCATION.	Length in miles.	Width in feet at surface.	Width in feet at bottom.	Depth in feet.	LOCKS.				DATE.		Cost of Construction.	
					Number.	Length in feet.	Width in feet.	Total rise and fall in feet.	When begun.	When completed.		
Pennsylvania:												
E. Div. Duncan's Island to Columbia.....	46	50-60	34	6	11	180	17	569	1837	1890	Paid capital, \$4,457,150 Debt, 63,271,000 5,547,000	
Juniata Div., D's I. to Hollidaysburg....	127	40-60	24-30	4	66	90	15					
Susqueh. Div., D's I. to Northumberland..	41	40-60	24-30	4	44	90	17					
W. Branch Div., N'berland to Farrisville....	80-5	40-60	24-30	4	43	90	17	115	1819	1837		
N. Branch Div., N'berland to Wilkesbarre..	64	40-60	24-30	4		90	17					
Union canal, Middletown to Reading.....	77-6	48	28	4-5		182	90					17
Junction, state line to Elmira, N. Y.....	18	42	26	4	11	90	17	43				
Del. and Hud., Honesdale to Rondout, N.Y.	108	48	30	6	106	100	15	1,028		1829	4,817,628	
Delaware Div., Easton to Bristol.....	60	44	26	6	82	90	11			1820		
Lehigh Coal and Nav., Easton to Coalport..	48	60-100	45	6	58	102	22	375	1821	1829	4,433,000	
Schuykill Coal and Nav., Mill cr. to Philad.	108	60-900	40-45	6	71	112	18-24	419	1816	1825	12,297,22	
Susquehanna, Columbia to Havre de Grace	45	50	30	5	80	170	17	228	1837	1890	4,594,185	
Wiconisco, Millersburg to Clark's Ferry...	12	45	28	4	7	90	17	24		1896	812,000	
Monongahela Nav., Pittsburg to N. Geneva..	85		Black water.	Variable.	8	190	56	49		1844	1,200,000	
New Jersey:												
Del. and Raritan, N. B'swick to B'dentown	43	75		8	14	220	34	150			2,000,000	
Morris and Essex, J. City to Phillipsburg.	101	40		5	29	93	23	1,634			2,000,000	
Delaware:												
Ches. and Del., Ches. City to Del. City....	12-6	66		10	8	990	24	32			3,547,541	
Maryland:												
Ches. and Ohio, G'town to Cumberland....	184-5	52-60	31-42	6	74	100	15	809	1828	1850	11,573,000	
Virginia:												
James R. and K'awha, R'mond to Buchanan	196-5	40		4	90	100	15	612			6,182,25	
Alexandria and Georgetown.....	7	60	42	6							1,000,70	
Dismal Swamp, Eliz. R. to D'mond lake..	88										1,151,000	
Albemarle and Chesapeake.....	8-5										170,000	
Ohio:												
Ohio Canal, Cleveland to Portsmouth.....	389	40	26	4	152	87-99	15	1,207			4,603,20	
Miami and Erie, Cincinnati to Toledo....	291	50-60		5-6	105	87-99	15	907			7,434,75	
Hocking, Carroll to Athens.....	56				26	87-99	15	208			973,40	
Walhonding (branch of Ohio canal).....	25				11	87-99	15	90			67,50	
Muskingum Imp't, Dresden to Marietta....	91	Variable.			19	75	16	126			1,627,42	
Indiana:												
Wabash and Erie, Evansville to O. state line	374	40	26	4	64	90	15	505	1823	1853	6,000,000	
Illinois:												
Ill. and Mich., Chicago to La Salle.....	100	160		7								
Michigan:												
St. Mary's falls ship canal.....	1	100	78-5	20	2	400	80	12	Enlarged 1873	Not completed		

The Erie canal, 363 m. long, connecting the Hudson river at Albany and Troy with Lake Erie at Buffalo, was commenced in 1817, and opened in 1825, costing \$7,602,000. It is to the efforts of De Witt Clinton principally that its construction is due. From the interest which he took in the subject as early as 1812, he was deputed with others to submit to the general government the project of connecting Lakes Erie and Champlain with the tide waters of the Hudson. This project failed, but he succeeded while for most of the time governor of New York in carrying through the enterprise as a state work. It was constructed through a region which was then for the greater part a wilderness, and was the most extensive public work that had been undertaken in the United States up to that time. It has since been enlarged, and has now a breadth of 70 ft. at the surface and 56 ft. at the bottom, and the depth has been increased to 7 ft. The locks have been made 110 ft. long and 18 ft. wide. It is carried over several large streams by stone aqueducts of great magnitude. There are 72 locks, 57 of which are double and 15 single. It rises 20 ft. at Albany by two double locks 110 by 18 ft., and is taken to West Troy, a distance of 6 m., where it is carried over a ridge of slate rock by 16 double lift locks to a height of 188½ ft. above tide water to Crescent, 6 m.; thence to lock No. 19, 9 m.; thence to Schoharie aqueduct by 11 locks, 30 m.; thence to Sprakers, 14 m.; thence to Frankfort, 36 m.; thence to Utica, 9 m., where by a lock of 3 ft. lift it reaches the summit, or long level, extending 53 m. from Utica to Lodi, a mile E. of Syracuse. At Lodi the canal falls 27 ft. by three double locks into the Syracuse level, where it is joined by the Oswego canal and united with the waters of Lake Ontario at Oswego, distant 38 m., by 18 single locks, each 110 by 18 ft. At Geddes, 2 m. W. of Syracuse, the canal rises 7 ft., and is carried thence to Jordan, 15 m., where it

falls 8 ft. into the Port Byron level, and is carried to Port Byron, 9 m. Falling at this place 11 ft. to Cayuga marsh level, it is carried 16 m. to Clyde; thence to Arcadia, 14 m., it rises through 7 locks; thence to Macedon, 12 m., where it again rises by 2 locks; thence to Pittsford on a level of 15 m.; and thence 5 m. to Brighton, rising by 4 locks. From Brighton, 3 m. E. of Rochester, to Lockport, there is a continuous level of 65 m. Commencing at Rochester, the canal increases in size as it proceeds west. At Lockport it is 98 ft. wide at the surface, 79 ft. at the bottom, and 7½ ft. deep. Here there are 5 double locks with a total lift of 56 ft. From Lockport to Buffalo there is a level of 31 m., for 3 of which it is cut through rock, with a width at the surface of 62 ft., at the bottom 60 ft., and 9 ft. depth of water. The canal is supplied with water from Lake Erie to the Seneca river, 142 m. E. of Buffalo. Thus most of the flow of water is from west to east, there being a fall through only five locks from east to west, between Lodi and the Seneca river. At Rome, 15 m. W. of Utica, the canal receives a large supply of water from the Black River canal, which falls toward Albany. The western part of the level between Utica and Syracuse receives water from Cazenovia lake and several other reservoirs, which falls westwardly, and at Syracuse supplies water to the Oswego canal. The level between Lockport and Buffalo is 568 ft. above the mean level of the Hudson river at Albany. The tolls received on all the New York canals for the year 1872 amounted to \$3,072,411. The value of property transported on the Erie canal was \$187,951,307; on the Champlain, \$28,590,107; on the Oswego, \$18,602,162; on the Chemung, \$1,275,236; and on the Chenango, \$165,801. The total value of property transported on the Erie canal from 1837 to 1872 inclusive was \$4,795,215,078. The following table gives the dimensions and capacity of the New York state canals:

NAME.	When authorized.	When completed.	Length in miles.	SIZE OF CANAL.				LOCKS.				Average burden of boats.	Max'm burden of boats.
				Width at surface.	Width at bottom.	Depth of water.	Number.	Length between quays.	Width in clear.	Feet of lockage.			
Erie Canal (original).....	1817	1825	363	40	28	4	88	90	15	654-90	70	76	
Erie Canal (enlargement).....	1835	1862	850½	70	56	7	72	110	19	.....	210	240
Oswego Canal (original).....	1825	1828	38	40	24	4	18	90	15	154-85	70	76	
Oswego Canal (enlargement).....	1847	1862	38	70	56	7	18	110	18	.....	210	240
Cayuga and Seneca Canal (original).....	1825	1828	21	40	24	4	10	90	15	.....	70	76
Cayuga and Seneca Canal (enlargement).....	1836	1862	23	70	56	7	11	110	18	76-61	210	240	
Champlain Canal.....	1817	1822	66	50	35	5	20	100	18	179-50	80	85	
" Glenn's Falls feeder.....	1822	1837	12	50	35	5	12	100	18	182-00	90	85	
" Pond above Troy dam.....	1822	1837	8	..	..	..	1	..	..	.....	..	..
Black River Canal and feeder.....	1836	1849	50	42	26	4	109	90	15	1,062-25	70	76	
Black River Canal (Improvement).....	1849	1861	42	..	..	..	1	110	18	.....	70	76
Genesee Valley Canal.....	1826	1861	134½	42	26	4	112	90	15	1,045-89	70	76	
Chenango Canal.....	1838	1836	97	40	24	4	116	90	15	1,015-33	71	76	
Chemung Canal and feeder.....	1829	1831	39	42	26	4½	58	90	15	504-38	85	90	
Oneida River Improvement.....	1839	1850	20	80	60	4½	2	120	80	7-35	70	76	
Oneida Lake Canal.....	1839	1836	7	40	24	4	7	90	15	62-00	70	76	
Baldwinsville Canal.....	1838	1839	5½	40	24	4	1	90	15	8-00	70	76	
Crooked Lake Canal.....	1839	1838	8	42	26	4	27	90	15	277-58	70	76	

The following table shows the total expenditures upon and receipts from the New York state canals to the close of 1866, each canal being cred-

ited with the amount of tolls upon the tonnage contributed to the Erie, and charged with its proportion of cost of repairs and maintenance:

NAME.	EXPENDITURES.			Residual less tolls.
	For construction, enlargements, and improvements.	For repairs, maintenance, and collection.	Total for construction and maintenance.	
Erie and Champlain.....	\$46,018,384	\$12,900,838	\$58,918,567	\$51,607,165
Oswego.....	8,490,949	4,689,319	8,180,168	2,338,390
Cayuga and Seneca.....	1,590,543	1,900,044	2,790,598	2,154,900
Chemung.....	1,378,361	1,794,649	2,067,910	2,022,325
Crooked Lake.....	888,987	450,874	792,681	530,414
Chenango.....	2,789,124	1,022,026	2,904,150	731,935
Black River.....	2,324,779	498,866	2,723,645	243,888
Genesee Valley.....	5,827,818	1,689,808	7,517,116	1,206,918
Oneida Lake.....	64,887	138,334	188,071	65,129
Baldwinsville.....	23,556	25,085	48,591	1,292
Oneida River improvement.....	146,944	25,005	171,999	204,398
Seneca River tow path.....	1,488	20	1,508	5,351
Cayuga inlet.....	2,968	.....	2,968	4,896
Total.....	\$64,710,883	\$24,877,108	\$89,587,940	\$97,322,046

—The Chesapeake and Ohio canal had its origin in a project of Gen. Washington for a chain of internal improvements by the route of the Potomac and across the mountains to the navigable waters which flow into the Ohio. In the year 1774 he procured the passage of a law by the legislature of Virginia empowering such individuals as were disposed to open the Potomac so as to render it navigable from tide water to Will's creek, but the war of the revolution interrupted the enterprise. In the fall of 1784 he again took up the subject. His plan was to improve the navigation of the Potomac to Cumberland, then a frontier fort, and to connect by common roads and portages with the Monongahela and Youghiogheny rivers. The legislatures of Virginia and Maryland appointed a joint commission, with Gen. Washington at its head, to examine the subject. In accordance with their report bills were passed by the legislatures of the two states which resulted in the formation of the Potomac company. The charter provided that the capital should consist of 500 shares of £100 each, with powers of enlargement; that the navigation should be improved from tide water to the highest practical point on the North branch; and that the company might construct canals and erect such locks as they might think necessary. Gen. Washington was elected the first president, and continued to act in that capacity until elected president of the United States. Three years were allowed by the charter for the completion of the work; but many difficulties being encountered, that time passed, and was successively extended five times by the Maryland and ten times by the Virginia legislature, till 1820, when it was concluded that the Potomac river could not be so improved as to answer the purpose required. The board of public works of Virginia, on Jan. 18, 1820, took such measures as finally resulted in the formation of a new company by which a continuous canal from Georgetown to Cumberland was completed, and publicly opened on Oct. 10, 1850. It lies on the Maryland side of the river, and passes through the valley throughout its whole length, except at Pawpaw Bend, 27 m. from Cumberland, where it passes through the moun-

tain by a tunnel 8,118 ft. in length. Its whole length is 184.5 m., with a total rise of lockage of 609 ft., which is overcome by 74 locks, and a tide lock connecting Rock creek basin with the Potomac river. It is 6 ft. in depth, and from Georgetown to Harper's Ferry 60 ft. wide at the surface and 42 ft. at the bottom. From thence to Cumberland it averages about 52 ft. at the surface and 31 ft. at the bottom. The locks are 100 ft. long and 15 ft. wide, and are capable of passing boats carrying 120 tons. The supply of water is abundant, drawn entirely from the Potomac. The cost up to the year 1851 was \$11,071,176. A branch to Alexandria, 7 m. long, crosses the Potomac over an aqueduct previously described. The earnings of the Chesapeake and Ohio canal from June 1, 1871, to May 31, 1872, were \$476,164, while the expenditures for construction and maintenance for the same time were \$223,859. During the year 1872 there were brought to Washington and Alexandria 922,177 tons of coal. The stock is principally owned by the state of Maryland. A president and six directors are chosen annually, the board of public works voting for the state.—The Delaware and Hudson canal, which extends from Rondout on the Hudson to Port Jervis on the Delaware, was constructed by a company for the transportation of coal to tide water. It has since been enlarged, the width being increased at the surface from 82 to 44 ft., and the depth from 4 to 6 ft. The locks were also increased in length from 76 to 100 ft., and the width from 9 to 15 ft. The cost of enlargement was \$6,817,658. There are now three locks on the Chesapeake and Delaware canal, one at the W. end of 16 ft. lift, and two E. of the summit, each of 8 ft. lift. They are 24 ft. wide in the clear and 220 ft. long in the chamber between gates, with 8 ft. depth of water. As the water for the summit level of this canal is mainly pumped up by steam, a water-saving basin has been built alongside the 16 ft. lock, of about eight times the area of the lock, which works well and saves about half the water that would be used without it. There are now 14 locks on the Delaware and Raritan canal, with lifts from 6 to 12 ft., of the same dimensions as those on

the Chesapeake and Delaware. All the locks on both these canals have drop gates at the upper end. They revolve around a horizontal hollow quoin in the bottom of the upper level, instead of vertical hollow quoins on the sides of the lock. The chambers of the locks are faced with plank, which is much less injurious to the boats than cut stone faces, and is said to be less expensive to keep in repair.—A comprehensive system of improvement of river navigation in connection with canals is in progress in the state of Illinois. The Illinois and Michigan canal, connecting Chicago on Lake Michigan with La Salle on the Illinois river, a distance of about 100 m., will be enlarged to a width of 160 ft. at the surface and a depth of 7 ft. The Illinois river, from La Salle to its junction with the Mississippi, a distance of 220 m., with a total fall of 28 ft., will be deepened and locks constructed for the passage of boats. One lock, at Henry on this river, was completed in January, and opened in March, 1872. It is 350 ft. long and 75 ft. wide, and will admit the passage of 12 canal boats at one time. In commencing the work for this lock 7½ acres were enclosed by a coffer dam made of timbers and sheet piling, protected by a gravel slope on the outside, and the water drawn with a rotary pump. The dimensions of the pit excavated for the foundation of the lock were 485 by 115 ft., and averaged 6 ft. in depth. After the excavation 3,200 bearing piles of hard wood, from 12 to 25 ft. long and 12 in. in diameter, were driven over the bottom, and on these 11 rows of timbers 12 by 12 in. square were placed longitudinally, extending 477 ft., and bolted to the piles. On these timbers transverse ones of the same cross dimensions were placed 6 in. apart and bolted, and all the spaces were filled with hydraulic concrete. The whole foundation was then covered with 2½ inch plank secured to the timbers. The walls of the lock are built of magnesian limestone laid in hydraulic cement. The water is received and discharged through culverts in the walls. The total amount of masonry used was 10,328 cubic yards. The gates are each 43 ft. wide and 24 ft. high, containing over 20,000 ft. of white oak timber and 27,000 lbs. of wrought and cast iron. Improvements are also being made in the navigation of the Little Wabash river by deepening and the construction of locks.—*Ship Canals.* The state of Michigan completed the construction of a ship canal at the Sault Ste. Marie, the strait which conveys the waters of Lake Superior into Lake Huron, in 1855. This canal was 100 ft. wide at the surface and 12 ft. deep, having a lock 370 ft. long and 70 ft. wide, with a lift of 12 ft., and was one mile in length. This work is now in course of enlargement by the general government, and when completed the width at the coping of revetting walls will be 102 ft. 6 in. and at the surface of the water 100 ft. At a depth of 18 ft. it will be 93 ft. 6 in. wide, and on the bottom, at a depth of 20 ft., it will be 73 ft. 6 in.

wide. The slope of the side after the wall is built, and of the rock excavation, will be 1 to 4, and the slope from 18 ft. depth to the bottom will be 5 to 1. There will be a system of two locks of 400 by 80 ft., and a single lock of the same dimensions, to overcome the difference of level at one lift.—The improvement of the navigation of the St. Lawrence river, which in some parts of its course is too rapid, was considered soon after the conquest of Canada, and the Lachine canal was proposed, to overcome the rapids of that name just above the city of Montreal, sometimes called the rapids of St. Louis. No practical steps were however taken till 1815, when the legislature made an appropriation for the work, which was commenced in 1821 and completed in 1826, at a total cost of \$488,404. Its dimensions at that time were 28 ft. wide at bottom, 48 ft. at water line, and 4½ ft. deep, with 7 locks, each 100 ft. long by 20 wide; and it was 8½ m. long. As early as February, 1816, a joint commission of both houses of parliament of Upper Canada reported on the project of connecting Lake Erie with Lake Ontario, and upon other works connected with inland navigation; and Col. Nicol subsequently introduced a bill appropriating money for a complete survey of the best route of water communication between Lakes Erie and Ontario, as well as between Lake Ontario and Montreal. In 1821 a commission was appointed to consider the subject, and it reported in 1823 in favor of constructing the Welland canal, of such dimensions as would accommodate the class of vessels then navigating the lakes. The result of this report was the incorporation of the Welland canal company, who proposed to establish the necessary communication by a canal and railway. They intended to run up the natural waters of the Welland river and to pass across the township of Thorold, tunnelling through a high ridge of land about a mile and a half. In 1825, this plan being considered objectionable, a new one was adopted. It was determined to have the entrance at the mouth of Twelve-Mile creek, or Port Dalhousie, and the upper terminus at the Welland river, from whence the supply of water for the canal was to be drawn. A new company was formed, and in 1829, five years after the commencement of the work, two schooners, one of 85 tons burden, ascended the canal from Lake Ontario to the Welland river. Subsequently the company proposed to extend the main line of the canal over the Welland river to Port Colborne, by enlarging about 5 m. of the feeder and excavating a new canal for the remaining distance of the bay. In 1851 the government approved this project and granted a loan of \$200,000, and the work was completed in 1853. It is now (1873) being again enlarged so that the locks shall be 270 ft. long, 45 ft. wide, and 12 ft. deep. The present dimensions of the Canadian canals connected with the navigation of the St. Lawrence were as follows:

NAME.	Length in miles.	Width in feet at surface.	Width in feet at bottom.	Number of locks.	Dimensions of locks.	Depth of water on sills.	Lift of lock, ft.	Cost in July 1, 1861.
Lochine.....	8½	120	80	5	200 x 45	9	44½	\$2,237,500
Welland.....	28	?	?	27	150 x 26½	10½	880	1,800,000
Beauharnois.....	11½	120	89	9	200 x 45	9	82½	1,611,000
Cornwall.....	11½	150	100	7	300 x 55	9	46	1,368,150
Farran's Point.....	½	99	50	1	200 x 45	9	4	1,200,000
Rapide Plat.....	4	90	50	2	200 x 45	9	11½	
The Galops.....	7½	90	50	8	200 x 45	9	15½	

—The Caledonian canal, the greatest work of its kind in Britain, passes through the centre of the Highlands from Moray frith on the E. coast to Loch Linnhe on the west. It has a total length of 60 m., including three lakes, Ness, Oich, and Lochy, whose combined length is 37 m. The 23 m. of artificial canal is 122 ft. wide at the surface, 50 ft. at the bottom, and has a depth of 20 ft. The work was done by the government from designs and under the superintendence of Thomas Telford. The total cost up to 1822, when it was opened, was £905,258, which to 1839 was increased to £1,023,628, the additional expense being principally made in 1839 by covering the slopes with stone work, by which means washing of them has been prevented. Since then steam power has been used upon the canal with perfect success, vessels drawing 17 ft. of water making from 7 to 11 m. an hour without injury to the banks. From May, 1824, to May, 1825, there passed through the Caledonia canal 1,142 vessels, of which 149 were steamers. In 1832, 162 steamers passed through. From May, 1855, to May, 1856, there passed through 1,932 vessels, of which 412 were steamers; and in 1867-'8, from May to May, 1,848 vessels found transit, of which 609 were steamers. It will be seen from these figures that the work possesses greater engineering than commercial importance. The Crinan canal, in Argyshire, uniting Loch Gilp with Jura sound, was commenced in 1793 by a company, but on account of financial embarrassments it was transferred to the barons of the exchequer in Scotland, who gave its management to the commissioners of the Caledonian canal. It is 9 m. long and 12 ft. deep, admitting vessels of 200 tons burden, and is constantly used by steamers. The North Holland canal, to which allusion has been made, was cut from Buikaluut, opposite Amsterdam, to the Helder, a distance of 51 m. It is 124 ft. in breadth at the surface and 81 ft. at the bottom, with a depth sufficient for the passage of vessels drawing 18 ft. of water. The open sea can be reached in about two days, but in winter considerable difficulty is experienced from obstructions by ice, the removal of which is expensive. Before the construction of this canal William I. had proposed to connect Amsterdam directly with the North sea. Afterward, the canal to the Helder proving inadequate to the wants of commerce, the idea was revived, and a new canal is now nearly com-

pleted (April, 1878), which mainly realizes the plan of King William. The first practical steps to accomplish the object were taken in 1852, but it was not till 1865 that work was actually commenced. A necessary adjunct is the harbor on the North sea, which was planned by Mr. John Hawkshaw of London, the consulting engineer of the company by which the work is prosecuted as a business enterprise. This harbor is formed by two piers, which spring from the shore at a distance of 3,917 ft. apart, converging toward each other at an angle of about 77° with the base line, and extending into the sea a distance also of 3,917 ft., where they are 2,165 ft. apart. Here the walls form angles and approach each other more rapidly for a distance of 1,132 ft., making the entire length of each pier 5,049 ft., and placing the outer termini at a distance of 853 ft. from each other. After several experiments, one of which was to attempt to build a sea wall from the natural bottom, the following system of construction was adopted: A layer of basalt rock about 20 metres wider than the sea wall, which has an average width at the base of about 40 ft., is first deposited to the depth of about 4 ft., and upon this the wall is erected of blocks of concrete laid in Portland cement, and with an inclination of one seventh of the height. When completed, the canal will have a width at the surface of 176.5 ft. (including berms, 186.5 ft.), and at the bottom a width of 89 ft., with a depth of 23 ft. There will be a double lock at either end.—The history of the present Suez canal, completed in 1869, is invested with peculiar interest. According to Strabo and Pliny, Sesostris (Rameses II., about 1300 B. C.) constructed a canal between the Pelusiac branch of the Nile and the Red sea; but Dr. Brugsch, who is supported by Lenormant and Chévalier, believes, from an examination of sculptures and inscriptions at Karnak, that it was built by Sethos, the father of Rameses. This canal only served to convey water, for which purpose alone it was probably intended. Necho, according to Herodotus, about 600 B. C., projected upon the same route the first ship canal of which we have any account; but he desisted from the work on being warned by the oracle that he was constructing it for the use of the invader. It was to have led from the Nile near Bubastis, by the city of Thoun, along a natural valley to Heroöpolis and thence into the lower Bitter Lakes, which are now about

40 m. from the present head of the Red sea, and which had then been cut off by a sand bank. It is said to have been continued by Darius Hystaspis as far as the lower Bitter Lakes; and though carried no further, it served to water the land through which it flowed. As built by Darius, the canal was 37 m. long. About 270 B. C. Ptolemy Philadelphus, who founded the city of Arsinoë on the northern extremity of the Heroöpolite gulf, carried the canal to near that place, and according to Diodorus connected it with the sea by locks. It was about 92 m. long, and on an average about 150 ft. wide, and from 15 to 80 ft. deep. Pliny says it was 30 ft. deep, and it probably was for some portion of its length. It cannot be ascertained how long this canal was used, but it became obstructed by sand before the time of Trajan, who restored it at the beginning of the 2d century, at the same time changing its route. The Nile was deserting the Pelusiac branch, and it was determined to bring the water from a higher part of the river. Trajan therefore commenced the work at Babylon, opposite Memphis, and according to Sharpe it passed by Heliopolis, Scanaë Veteranorum, Heroöpolis, and Serapion, joined the upper Bitter Lakes, and then passed to the Red sea at Clismon (which took its name from the locks), about 10 m. S. of Arsinoë. That town had ceased to be a port, having been separated from the sea by the drifting sands. This canal also became useless from the same cause, and remained so till the conquest of Egypt, 638-640, by Amr, the Arab general of the caliph Omar, who again restored it and gave it the title of the "Canal of the Prince of the Faithful." It was again used for more than a century, when it was finally destroyed by the command of the caliph Al-Mansour in 767, since which time it has never been restored. In modern times attention was first called to the subject of a canal across the isthmus of Suez by Napoleon I. during his invasion of Egypt. He had a survey made by a corps of engineers, who reported that the level of the Red sea was 30 ft. higher than that of the Mediterranean; an error which remained undisputed till 1840, when an English officer was led to the opinion from barometric measurements that the two seas had about the same water level at mean tide. The subject was agitated till 1847, when France, England, and Austria commissioned M. Talabot, Mr. Robert Stephenson, and Signor Negrelli to make a survey, which they did, reporting that the two seas had exactly the same mean level. Another examination was made in 1853, which confirmed the correctness of the survey of 1847; but Mr. Stephenson expressed an unfavorable opinion of the feasibility of the construction of a canal which would answer the purposes of commerce, on account of the liability of its becoming obstructed by sand, which had been a cause of difficulty with the canal of the Pharaohs, upon the old route of which, or near it, it was thus far proposed to construct the new

one. There seemed to be much force in his position, and the project was never so favorably entertained by the English as by the French. In 1854 the viceroy of Egypt, Said Pasha, granted to M. Ferdinand de Lesseps, an engineer belonging to the French diplomatic service in Egypt, and a company to be formed by him for the purpose, the exclusive right of constructing a ship canal from Tineh, near the ruins of ancient Pelusium, to Suez. The plan of M. de Lesseps differed from those which had previously been considered, by proposing, instead of connecting the canal with the Nile, a more direct route, and instead of cutting it alongside of the chain of lakes that lie between the two seas, to carry it through them in a nearly direct line, and adopt a more easterly location for the northern terminus. The company was organized in 1858 under the title of *la compagnie universelle du canal maritime de Suez*, and was guaranteed the right of way for 99 years, with the consideration that the Egyptian government is to receive 15 per cent. of the tolls. The company's capital was at first 200,000,000 francs, in 400,000 shares of 500 francs each, which was increased in 1867 by a loan of 100,000,000 francs. The work required two distinct undertakings. The first and principal was the construction of the broad and deep salt-water channel, extending from Port Said to Suez, without locks. The other, preliminary in point of time, though secondary in importance, was the construction of a fresh-water canal, for transportation as well as for supplying water to the workmen and their families along the line. This canal commences at a place called Zagazig, and, receiving water from the Nile, is carried to Suez, much of the way along the line of the ancient canal of the Pharaohs. It is navigable the whole distance, falls being overcome by locks. At Ismailia (named after the present khedive Ismail Pasha, who succeeded his uncle Said Pasha in 1868), a central point on the great canal at Lake Timsah, water was forced into a double line of 9-inch pipes, and carried by them along the line of the canal to Port Said. The length of the Suez canal is about 100 m., of which 75 m. are actual canal, while for 25 m. it passes through lakes, a portion of which afforded water of sufficient depth, but the greater part of which required excavating. The width of the canal, except at those places where it runs through high ground, is 325 ft. at the surface and 72 ft. at the bottom, and the depth 26 ft. At the places referred to the width is only 195 ft. at the surface, with slopes of 2 to 1. At El-Guisr, a few miles north of Lake Timsah, for a distance of 11½ m. the canal encounters the highest ground, the excavation varying from 30 to 85 ft. in depth. Twenty-five dredges and an immense force of laborers were engaged upon this division at one time, removing about 600,000 cubic metres of earth per month. The works at Port Said consist of a basin 875 yards square, and of an eastern and

western storm jetty, extending into the sea, the eastern jetty being 3,609 and the western 2,515 yards long, having a distance of 437 yards between them. The jetties are constructed of blocks of *béton aggloméré*, made of hydraulic lime from Teil in Ardèche, France, and beach sand. The channel is dredged to a depth of 26 ft. for a good part of the enclosed space. At the Suez extremity the harbor is also dredged to a depth of 26 ft.; a break-water protects the entrance from southerly winds, and a basin, constructed by the company, affords a good harbor. The canal was officially opened Nov. 17, 1869, at which time 50 ships had passed from one sea to the other. In 1871 there passed through 765 vessels, of which 648 were steamers and 63 men-of-war. The total receipts from tonnage, coasters, passengers (10 fr. per head), and piloting, were \$1,880,455.—In 1870 the government of the United States sent out two exploring expeditions for the purpose of ascertaining the practicability of uniting the Atlantic and Pacific oceans by a canal across the American isthmus. One of these expeditions was sent to the isthmus of Darien, and the other to that of Tehuantepec. The latter, under the command of Capt. Shufeldt of the navy, originated from a grant by the Mexican government to a company formed by Emilio La Sere, which has been transferred to the Tehuantepec railway company. The report of the officers who made the exploration and surveys, as well as that of those who had made previous surveys, is to the effect that no extraordinary engineering difficulties are presented. It is estimated that sufficient water can be procured from rivers in the Sierra Madre to amply feed the canal. The route commences about 80 m. above the mouth of the Coatzacoalcos in the gulf of Mexico, and traversing it for a considerable distance, ascends to a level of about 680 ft., then descends to the lagoon on the Pacific, a total distance of about 120 m. It is the most northern route that can be selected, and makes the distance from New Orleans to Hong Kong 9,900 m. less than by way of Cape Horn, and 1,218 m. less than by way of the isthmus of Darien. From New York to Hong Kong the distance by way of Tehuantepec is 8,245 m. less than by way of Cape Horn, and 1,588 m. less than by way of the isthmus of Darien; and the route from Liverpool to eastern Asiatic ports is also considerably shortened. The Darien expedition, under Commander T. O. Selfridge, surveyed three routes across the narrower part of the isthmus which have been reported as impracticable, on account of the extent of tunnelling which would be required; a locked canal being out of the question for want of water. Five months were spent in surveying the route of the Atrato and Tuyra rivers, but the broken nature of the country and the swamps encountered were considered unfavorable. The route by the Napipi river, a branch of the Atrato, was then surveyed, upon which Commander Selfridge

made a favorable report. He proposes to lock up to a summit of 180 ft. from the Pacific, by 18 locks, and from the entrance of the canal on the Atrato, which is 40 ft. above the level at the mouth of the river, to rise by 9 locks, 90 ft., to the same level. Eight miles of this level will include three miles of cutting 125 ft. deep, and a tunnel of five miles, sufficiently high to admit the largest ships; and he estimates the cost at \$125,000,000. He is now (April, 1873) surveying the valley of the Bojaya, a still more southern tributary of the Atrato, which is regarded as a more favorable route. An expedition to Nicaragua is also engaged in examining the route surveyed by Col. Childs in 1850-'51. The line selected by him proceeds from Lake Nicaragua to Brito on the Pacific. It traverses the lake to its outlet at Port San Carlos, follows the San Juan river for about 90 m., and then uses a canal to the harbor of San Juan del Norte, the total distance being 194 m. This plan includes 14 locks on each slope.

CANALE, Niccolò, a Venetian admiral who lived in the second half of the 15th century. In 1469 he was commander of the Venetian fleet at Negropont (the ancient Chalcis), and succeeded in seizing the town of Enos, belonging to Turkey, but wholly occupied by Greeks. The cruelties perpetrated upon the inoffensive inhabitants created great indignation at Constantinople, and Mohammed II., with a view of avenging the outrages, besieged Negropont with a force of 120,000 men, and after a violent contest expelled the Venetians in July, 1470. Canale, to whom this defeat was attributed, was sentenced to death by the council of ten; but at the instance of Pope Paul II. and of other influential persons, his punishment was commuted to exile for life at Porto Gruero, where he died.

CANALETTO, or **Canale, Antonio**. I. An Italian painter, born in Venice, Oct. 18, 1697, died there, Aug. 20, 1768. His father was a scene painter, and educated him to the same profession. He resided for a time in Rome, about the year 1719, and there studied the remains of antiquity, and gained the reputation of an accomplished artist. On his return to Venice he painted numerous views of that city, reproducing with great accuracy its palaces, churches and canals. The best of these was the view of the Grand canal, which is now in the gallery of the Louvre. He spent two years in England, and painted an interior view of King's chapel, Cambridge. His works are found in all the galleries of Europe. II. Nephew of the preceding, also known as Canaletto, but whose real name was Bernardo Belotto, born in Venice in 1724, died in Warsaw in 1780. He was a pupil of his uncle, whose style he successfully imitated, excelled in perspective, and for some years painted in Dresden, London, and other cities.

CANANDAIGUA, the capital of Ontario co., New York, situated at the N. end of the lake of the

same name, 24 m. S. E. of Rochester; pop. of the township, in 1870, 7,274; of the village, 4,862. The New York Central railroad is here joined by the Canandaigua branch from Rochester to Elmira, and by the Canandaigua, Black Rock, and Tonawanda railroad. From the upper part of the village the ground slopes gradually toward the shores of the lake, affording a magnificent view. Many of the residences are surrounded by fine gardens and grounds ornamented with great taste. There are several churches, a court house, academy, and two weekly newspapers. The lake is 15 m. long and from $\frac{1}{2}$ to $1\frac{1}{2}$ m. wide.

CANANORE, or **Canara**, a seaport town of British India, in the province of Malabar, presidency of Madras, situated on a small bay, in lat. $11^{\circ} 52' N.$, lon. $75^{\circ} 26' E.$, 45 m. N. W. of Calicut; pop., including a tract of land extending 2 m. further inland, about 40,000. The fort is built on Cananore point, and ships may safely anchor in this vicinity in about five fathoms of water, the approach to the harbor being dangerous in other directions. The place is irregularly laid out, but there are a number of good houses, especially the residences of the former local rulers. It is the principal military station in the province of Malabar; the fort has been strengthened by the English, and there are barracks for three regiments. Cocoanuts are exported to Arabia, Sumatra, Bengal, and Surat, together with pepper, sandal wood, grain, shark fins, and coir cordage; the imports are horses, piece goods, sugar, camphor, opium, silk, and benzoin. The town is of great antiquity. It was taken in 1501 by the Portuguese, who fortified it, but were expelled by the Dutch in 1664. The latter sold it to a native Mohammedan family, the head of which, under the title of *debees*, possessed absolute sovereignty over it, with a small adjacent territory and the Laccadive islands, till 1791, when it became tributary to the English.

CANARA, a district of British India, occupying a narrow strip of the W. coast of Hindostan, between the summits of the Ghaut mountain range and the Arabian sea, bounded N. by Goa, E. by Bejapoor and Mysore, and S. by Malabar. Its extreme length from N. to S. is nearly 240 m.; breadth from 18 to 80 m.; area, 7,228 sq. m.; pop. about 1,100,000. The natives call the district Tutawa, and the present designation was probably formed by Europeans from Carnata, the ancient name of a kingdom in the Deccan. A somewhat indefinite boundary running E. and W., about lat. $13^{\circ} 40' N.$, divides the district into two parts, North and South Canara. The surface of both portions is mountainous in the eastern part, but in the western a plain stretches between the mountains and the sea. The chief products are cocoanuts, pepper, and sandal and teak wood. The inhabitants are generally followers of Brahmanism, but there are also many Jains and a few Mohammedans.—Little is known of the early history of the district, but about the mid-

dle of the 18th century it was conquered by Hyder Ali and incorporated in his dominions. It remained a part of the kingdom of Mysore until in 1799 it was added to the British conquests in India. In North Canara the principal cities are Condapoor, Batcull, Honahwar, Coomta, Mirjan, Unkola, and Sedashevagurh; in South Canara are Mangalore, Buntwalla, Udapi, Barcur, Karkull, and Jamalabad. Mangalore is the chief town of the district, and through it a large part of the trade of the region is carried on.

CANARIS, or **Kanaris**, *Constantine*, a Greek naval officer and statesman, born in the island of Ipsara about 1790. At the outbreak of the revolution of 1821 he was captain of a merchant vessel. Shortly after the devastation of the island of Scio by the Turks, he followed the fleet of the Greeks under Miaulis with two fire ships to the harbor of that island (June, 1822), and succeeded in attaching them to the vessels of the capudan pasha and capudan bey, of which the one, lighted up at the time in celebration of the Ramadan, was blown up with thousands of men, and the other scarcely escaped as a wreck. In November, 1822, he performed a similar exploit in the harbor of Tenedos, which saved the Greek fleet from destruction. He revenged the Turkish cruelties on his native island by a new victory at Samoa, near the promontory of Mycale, Aug. 17, 1824, which saved the island of Samoa from the fate of Scio and Ipsara. But his bold attempt to burn the Turkish fleet in the harbor of Alexandria, where it lay ready to take the troops of Mehemet Ali to the Morea, was baffled by contrary winds at the moment of execution (Aug. 4, 1825). He was placed in command of the frigate *Hellas* sent from America, was elected in 1827 representative of Ipsara in the national congress at Castri, and in 1828 was appointed commander of Monemvasia, and subsequently of a naval squadron. After the assassination of Capo d'Istria, in 1831, he retired to Syra, but afterward reentered the navy with the rank of captain. Under King Otho he served from 1846 as admiral, senator, president of the council, and minister of marine, till 1855, when he resigned. In the spring of 1858, disgusted with the conduct of the government, he sent back to it all his orders and commissions, resolved thenceforth to be only a private citizen. In 1861 he refused a pension of 12,000 francs and declined the grade of vice admiral. Returning to public life, he was made prime minister, Jan. 26, 1862. He was prominent in the provisional government of 1863, and was a member of the deputation sent to Copenhagen to offer the throne to Prince George. In March and April, 1864, he was minister of marine and president of the council, and again from August, 1864, to March 14, 1865.

CANARY BIRD (*fringilla Canaria*, Swains.), a well known member of the finch family, a native of the Canary islands, but naturalized in

Europe and the United States. The native bird differs materially from the variety commonly seen in cages; the adult male has a much darker bill; the general color of the plumage va-



Canary Bird.

ries from a greenish yellow on the front, chin, throat, and breast, to a golden yellow on the belly; the sides, thighs, and under tail coverts are dirty white; the top of the head, back, and upper tail coverts, brown ash, with a longitudinal brown spot down each feather; the wing feathers, brown black, with pale brown edges, margined with white near the back. The color of the female is more dingy and indistinct, having much less greenish yellow about it. In size it is smaller than the domesticated species. It builds in thick bushes and trees, pairs in February, and lays from four to six pale blue eggs, hatching five or six broods in a season. It is very familiar, and frequents the gardens of Madeira, where its song is highly prized.—The domesticated species is about 5½ inches long, with a pale bill, and the whole plumage of a rich yellow color, with the edge of the wing yellowish white; the colors of the female are less bright. The original stock is said to have been imported from the Canary islands about the 14th century; in Europe it has been mixed with the aberdevine (*carduelis spinus*), the venturon (*fringilla citrinella*), the serin (*fringilla serinus*), the goldfinch (*carduelis communis*), and various other birds, producing hybrids, fertile and sterile, of great variety of color and characters. There are about 50 varieties of the canary. They are bred in immense numbers on the continent of Europe, and many are imported into the United States from Germany. The two varieties most prized by amateurs are the jonquil and the mealy, which combine the greatest beauty of color with excellence in song; the latter have a bright orange cap, this color pervading the whole plumage, except on the wings and tail, which are deep black; the former have the neck, back, and wings waved and mottled with purplish gray tints. The German birds have often considerable green in their plumage. The most mottled varieties may be as good singers as those of the purest colors. The song of the canary is familiar to every one. With less power, compass, and variety than the nightin-

gale, it has greater powers of imitation, a better ear, and a better memory. It becomes very tame, is capable of attachment to man, and is easily educated to perform tricks at public exhibitions. Their dispositions are as various as their colors. They begin to pair about the middle of February, and will make a very neat nest if the proper materials are supplied to them; they will also lay in nests artificially prepared. The time of incubation is 13 or 14 days; the number of eggs is usually six. The young partake of the physical characters of the parents, whether gay or mottled. Their favorite food is canary seed, to which a little rape and hemp seed may be occasionally added; they should have light, fresh air, plenty of water to drink and bathe in, and free access to sand or gravel; a sprig of chickweed or a leaf of lettuce is highly relished by them. The canary will thrive very well on this food; when breeding, the yolk of a hard-boiled egg should be given them. Their diseases are due principally to improper or too much food; cleanliness and attention to sifting their seed will generally protect them from parasitic insects.

CANARY GRASS (*phalaris Canariensis*), an annual grass native to the Canary islands, cultivated for its seeds, with which tame birds, especially canaries, are fed. It is raised on the



Canary Grass.

isle of Thanet in the county of Kent, England, also in parts of Italy, France, and Switzerland. It has a stalk one to three feet high, topped by an oval, close-grained panicle. It requires a good soil and an open country.

CANARY ISLANDS, or **Canaries** (Span. *Islas Canarias*), a Spanish colony in the Atlantic ocean, off the N. W. coast of Africa, between lat. 27° and 30° N., and lon. 13° and 19° W., comprising a group of islands of which the principal are Teneriffe, Grand Canary, Palma, Lanzarote, Fuerteventura, Gomera, and Ferro; area, 2,800 sq. m.; pop. in 1867, 267,036. The islands are volcanic, rocky, and mountainous. The principal mountain is the volcanic peak of

Teneriffe, 12,182 ft. high. The watercourses which traverse the islands are sometimes swollen to torrents, and sometimes dry. The soil is fertile, and the climate, although at times excessively hot, and exposed to severe changes and to a pernicious hot wind from the African continent, is on the whole salubrious. The vegetation of both the tropical and temperate zones flourishes here in great luxuriance, and has been described at length by Humboldt and by Von Buch. Horses and cattle are scarce, but other kinds of domestic animals abound; only a few, however, are indigenous. The reptiles are limited to a small scorpion, a *scelopendra*, and the frog. Among the insects is a species of troublesome gnat or mosquito. Among the birds are the African vulture, the falcon, buzzard, sparrow hawk, kite, two species of owl, three of sea mew, the goldfinch, the quail, wren, magpie, and the canary. The only freshwater fish is the eel. Marine fishes are scarce, but whales and seals are occasionally seen. Wine was formerly the chief article of export, the annual produce being about 40,000 pipes. But in 1853 the crop was nearly all destroyed by the grape disease, and cochineal took its

place, the produce rising from 800,000 lbs. in 1849 to 1,500,000 in 1856, and 6,037,894 lbs. for the year ending June 30, 1870. Its commercial value, however, declined from about \$1 per lb. in 1866 to about half as much in 1870. The value of the entire exports from the two principal ports, Teneriffe and Las Palmas, in 1870 was about \$3,200,000, of which cochineal formed \$2,550,000, and vegetables, nuts, and fruits \$400,000; about four fifths of the exports were to England. Potatoes and onions are shipped to Cuba and the West Indies; the export of wine was about \$40,000. The value of the imports at these ports was about \$3,100,000, of which about \$1,000,000 were manufactured goods, \$300,000 flour and grain, \$260,000 guano, \$275,000 sugar, molasses, and spirits, \$180,000 wood and lumber, and \$120,000 oil. At these ports there entered 191 steamers, tonnage 187,000, and 1,184 sailing vessels, tonnage 102,000. Of the steamers, 131 merely touched at the islands on the voyage between England and the coast of Africa; of the sailing vessels, 796 entries were from one island to another, 107 from Spain, 46 from England, 85 from France, 86



View in the Canary Islands.

from the West Indies, and 11 from the United States. Some raw silk is manufactured on the spot into silks and ribbons; coarse linen and woollen stuffs are made for home consumption; the leaves of the date palm are made into hats and baskets; but the bulk of manufactured goods is imported.—The Canaries are supposed to be the islands which are mentioned by the elder Pliny, and also by Plutarch and Ptolemy, as the Fortunate islands. They were visited by Moors in the 12th century, and by Italian navigators in the 13th; and in 1384 they were rediscovered by a Spanish vessel which had been driven thither by stress of weather. After various abortive expeditions, the first effectual attempt at conquering them was made, with the assistance of Spain, by Jean de Béthencourt, a gentleman of Normandy, in the beginning of the 15th century. (See BÉTHENCOURT.) After various conflicts, caused by the subsequent governors of the islands, by the resistance of the natives, and by the claims set up by Portugal, they passed eventually into the possession of Spain. They are now under the same form of administration as the other provinces of Spain, and are represented in the cortes; the captain general resides at Santa Cruz de

Tenerife. The inhabitants are chiefly Spaniards (slightly darker than those of the mother country), though some claim descent from the aborigines, named Guanches, who however are extinct. There are two bishoprics, and the prevailing religion is the Roman Catholic. Spanish is the only language in use.

CANBY, Edward Richard Sprigg, an American soldier, born in Kentucky in 1819, killed in Siskiyou co., California, April 11, 1873. He graduated from West Point in 1839, became second lieutenant of the second infantry, served in the Florida war, and in 1842 superintended the emigration of Indians to Arkansas. In the Mexican war he fought at Vera Cruz, Cerro Gordo, Contreras, Churubusco, and the city of Mexico, and was twice breveted for gallantry. He became major of the 10th infantry in 1855, and colonel of the 19th in 1861. After the outbreak of the civil war he commanded in New Mexico from June 23, 1861, to Sept. 18, 1862, being stationed at Fort Craig on the Rio Grande, and engaged in the battles of Valverde, Feb. 21, and Peralta, April 15, and was made brigadier general of volunteers March 31, 1862. He was much employed by Mr. Stanton as a consulting officer in the war department, and

was sent by him to command at New York from July 14 to Nov. 15, 1863, to suppress draft riots. On May 7, 1864, he was promoted major general of volunteers, and took command of the department of West Mississippi. He conducted the operations against Mobile, twice received the national thanks from the president, captured the city April 12, 1865, and received the surrender of the confederate armies of Gens. Taylor and E. K. Smith. He was severely wounded in 1864, was twice breveted, and was commissioned brigadier general in the regular army July 28, 1866. He was often chosen for special and difficult duty, and in 1869 he took command of the department of the Columbia. Difficulty arising with the Modoc Indians in the winter of 1872-'3, he devoted himself to its settlement, and was holding a parley at a short distance from his camp with a flag of truce, when he was treacherously shot by a Modoc chief known as Captain Jack.

CANCALE, a seaport town of France, department of Ille-et-Vilaine, situated on the W. end of St. Michael's bay, 10 m. N. E. of St. Malo; pop. in 1866, 6,400. The harbor is enclosed by a chain of rocks, named *Rochers de Cancale*, where are found excellent oysters.

CANCER (Lat., a crab), the fourth sign in the zodiac, designated by the mark ♋; also, a constellation of stars formerly occupying the sign Cancer. The tropic of Cancer is the northern boundary of the torrid zone, where the sun is vertical at noon at the summer solstice.

CANCER, a malignant disease which attacks various organs of the human body, and tends to the progressive invasion of neighboring tissues and the final destruction of the parts; so called, because in some forms of the disease the fibrous ramifications extending in various directions were likened to the limbs of a crab. The most familiar and characteristic form of cancer is that which attacks the female breast, usually past the middle period of life. It first appears as local induration situated beneath the skin, in the glandular tissue of the organ, for the most part in the neighborhood of the nipple. It increases slowly in size, becomes adherent to the skin, and involves more and more of the substance of the breast. In most cases sharp lancinating pains are experienced at this time, sometimes causing much distress. When the glandular substance of the breast has become fully affected, it is also found to be adherent to the walls of the chest, so that it can no longer be moved from side to side, and the skin over its whole surface is discolored, smooth in texture, raised in irregular knobs or eminences, and in spots red and tender. The early hardness now yields to local softening, the skin gives way at some prominent point, and the ulcer thus formed shows no tendency to heal, but constantly enlarges, and discharges a dark-colored and fetid exudation. Subsequently the morbid growth involves the subjacent muscles, the ribs, and even the substance of the

lungs. Internal cancer, however, is often developed as a secondary affection, without being directly continuous with the external growth. The patient may be gradually exhausted by the pain, discharge, and constitutional irritation dependent upon external cancer alone, or the fatal termination may be principally due to the secondary affection of the internal organs. The course of cancer is for the most part slow, requiring several years to pass through its successive stages. This is generally the case in cancer of the breast. In other forms, particularly where the morbid growth is softer and more vascular at the outset, it often terminates in a few months, or even weeks. Cancerous tumors, while still movable and well defined, are often removed by surgical operation with great relief to the patient.

CANCERIN, Georg, a Russian statesman, born at Hanau in Germany, Dec. 8, 1774, died in St. Petersburg, Sept. 22, 1845. He was educated in Germany, and while at Göttingen published a treatise on mining interests. He was employed in the Russian civil service in the department of the interior, and while there published a pamphlet upon the commissariat, at that time notorious for disorder and malversation. This led to his transfer in 1796 to the commissariat of the war department. In 1811 he was appointed a councillor of state, and at the beginning of the war of 1812 he became commissary general of the western army, and in 1818 of the whole Russian forces, participated in the campaigns of 1813-'14, and accompanied the emperor Alexander to Paris. Some question as to Cancerin's integrity in negotiations with the French government in 1815 led to his resignation as commissary, but he remained in the service. During this period he wrote *Weltreichthum, Nationalreichthum und Staatswirthschaft*, a treatise on political economy (St. Petersburg, 1821), and *Ueber die Militärökonomie im Frieden und Kriege* (3 vols. 8vo, 1822-'3). He was minister of finance from 1823 until his death. He farmed out the monopoly of the sale of salt and liquors, with profit to the government, and promoted industry by a stringent protective tariff.

CANDACE, an Ethiopian queen who invaded Egypt in 22 B. C., but was defeated by Petronius, the Roman governor. In the Acts of the Apostles mention is made of Candace, queen of the Ethiopians, that is, of Upper Nubia, between the Nile and the Athara. Candace was probably not an individual name, but the title of a succession of female sovereigns.

CANDAHAR, or *Kandahar*. I. A S. province of Afghanistan, consisting of mountains and arid plains, bounded N. by the territory of the Hezareh, N. E. by Cabool, S. E. by Sewistan, S. by Beloochistan, and W. by Seistan and Herat. The country is generally barren, but there are some fertile regions, by the rivers, where grain, tobacco, and fruits are produced. Among the wild animals are wolves, hyenas, bears, leopards, wild asses, &c.; and among the

tame are camels, mules, and most of the domestic animals of Europe. A considerable transit trade is carried on, the road between India and Persia passing through the country. Candahar formed part of Persia, was for some time subjugated by the Mogul sovereigns of Delhi, and was again annexed to Persia by Nadir Shah. On the death of this conqueror

it became a province of eastern Afghanistan. The inhabitants are mostly Mohammedans of the Sunhi sect. II. The principal city of the province, in lat. $32^{\circ} 37' N.$, lon. $65^{\circ} 20' E.$, 280 m. S. E. of Herat, and 275 S. W. of Cabool; pop. about 80,000. It is fortified, and a place of military and political importance. Formerly it was the capital of all Afghanistan, but in



Candahar.

1774 the seat of sovereignty was transferred to Cabool. The city is well laid out, the streets are at right angles, and the four principal streets, which are very wide, meet at a circular place in the centre of the city. The town is situated near the Urghundaub, and small channels of river water run through the main streets. In 1839 it was occupied by the British, who soon abandoned it; in 1854 it was recovered by Dost Mohammed of Cabool; and in 1858 it fell into the hands of Yakub Khan of Herat.

CANDAULES. See **GYGES**.

CANDEISH, *Candesh*, *Khandelsh*, or *Khandesh*, a district of British India, presidency of Bombay, division of Poonah, bounded N. by the territory of Holkar, E. and S. by the Nizam's dominions, and W. by Guzerat; area, 12,078 sq. m.; pop. about 800,000. It is watered by the Nerbudda and the Taptee. In the 15th century Candeish was governed by independent sovereigns; toward the close of the 16th it was annexed to the Mogul empire. On the overthrow of the peishwa in 1818, it became a British possession.

CANDI. See **CANDY**.

CANDIA, or *Crete* (anc. *Creta*). I. An island forming the southern limit of the Grecian archipelago, lying between the Morea on the N. W., Asia Minor on the N. E., and Africa on the S., and constituting the Turkish vilayet of

Ghirit. It extends from E. to W. about 160 m., across three fourths of the breadth of the *Ægean*, which is entered on the western side of the island by the channel or strait of Cerigotto, and on the eastern by the strait of Scarpanto; average breadth, 20 m.; area, about 8,300 sq. m.; pop. in 1871, 270,000, of whom 200,000 were Christians, 60,000 Mohammedans, 2,000 Jews, and the rest foreigners, chiefly French, Italians, and Austrians. The Mohammedans, Jews, and foreigners generally live in the cities, and the Christians in the villages. Throughout its entire length, it is nearly centrally ridged by a chain of mountains, which send off to the south spurs terminating in bluffs, rendering the S. coast inhospitable; while to the north the spurs gradually slope to a low coast, forming several tolerable harbors, of which the principal are Canea, Retimo, Candia, and Suda, the last mentioned being the best the island affords, and the station for all foreign men-of-war. The mountain chain of Candia is naturally divided into three parts: the eastern, or ancient Diotæan mountains, now called Sitia; the western, or ancient Leuci (white) mountains, now the Sphakiote mountains; and the central chain, anciently called Ida, whose middle and principal peak is now known as the Psiloriti, rising to a height of 8,000 ft. above the sea. The coasts are very irregular, and are deeply indented by the spurs

of the mountain chain. The mountains, of calcareous formation, abound in caverns and grottoes. In this island was the famous labyrinth of the Minotaur, which was probably one of these grottoes, rendered more intricate by the art of Dædalus, under the directions of Minos. Some travellers have placed this labyrinth in the neighborhood of ancient Gortyna, S. E. of Mount Ida. Cape Matala, the southern point of the island, is the most southern land of Europe. Candia can scarcely be said to have any rivers, the watershed of the mountains not exceeding 15 m. in breadth either way to the sea. In the rainy season torrents are precipitated from the mountains, but they dry up in the summer, and the only resources for the irrigation of the land are the small springs which abound among the hills. The island is nevertheless tolerably fertile, but not more than one third of the arable land is cultivated. The neglect of agriculture is owing to the idleness of the people and the many holidays they keep. The farm implements are of the rudest kind; and of wheat, barley, oats, cotton, and corn, not enough is raised for home consumption. The products of the ground for exportation are olives, raisins, figs, almonds, chestnuts, oranges, lemons, and other fruits requiring little cultivation. But much attention is paid to silk raising; the silk is of superior quality, and, with cocoons and silkworm eggs, is exported in considerable quantities, principally to Austria and France. There is good pasturage among the hills, and large numbers of goats and sheep are raised, but comparatively few cattle, mules, and horses. The climate is mild and generally healthy, with the exception of those portions of the valleys not readily drained, which in the summer months are extremely unhealthy. Leprosy is the only endemic. The thermometer ranges from 60° to 70° F., in extreme instances rising to 88°. The N. wind (called by the natives *ebnat*) tempers the summer heat. The peaks of the mountains, especially in the western and central part of the chain, are covered with snow for three fourths of the year. Among the numerous birds of beautiful plumage and song is the *kajabulbul*, which is so much esteemed in Turkey as to command a price of \$100. Many of the trees and shrubs are aromatic. The commerce of Candia is chiefly in the hands of Turks, and very few Greek merchants are engaged in foreign trade. The Cretans in 1871 owned 28 vessels of small size, employed only in coast trade and in carrying fruit to Turkish and Greek ports, and the foreign freights are wholly in foreign vessels. The commerce for the year ending Sept. 30, 1870, at the ports of Candia, Canea, and Retimo, was: imports, \$2,014,760; exports, \$2,340,200. There are four silk factories, manufactories for bags, cotton shirtings, and towellings, and 86 soap factories, which in 1871 made 600 tons of soap.—Crete was originally settled by Phrygians, Pelasgians, and Phœni-

cians, and so populous in early times that Homer spoke of it as the island "of a hundred cities" (*ἐκατόμπολις*). The legends of Minos whose power swayed the island and the surrounding seas, are part of the numerous traditions referring to its remote antiquity. About 1000 B. C. Crete was conquered by the Dorians, who had occupied the Peloponnesus. They founded in the island a number of independent republics, whose constitutions closely resembled those of Sparta, and of which Cnossus in the northeast, Cydonia in the northwest, and Gortyna in the south were the most prominent. In later times democracy supplanted the Dorian institutions, and the Cretans became proverbially degenerate. They preserved, however, their renowned ability as archers, serving as mercenaries in foreign armies. The island was conquered by the Romans in 67 B. C. In the partition of the empire, Crete fell to the East and was held till about A. D. 823, when it was taken by the Saracens, who retained its possession till 961, when it was reconquered by Nicephorus Phocas. On the conquest of Constantinople by the crusaders, it was allotted to Boniface, marquis of Montferrat, who sold it to the Venetians, Aug. 12, 1204. The Venetians ruled the island with ability and rigor, and successfully defended it against the Genoese, and for a long time also against the Turks. After various attempts and long sieges, however, it was occupied by the latter toward the close of the 17th century, the capital, Candia, having succumbed in 1669. In the west alone, the Sphakiote mountaineers continued to defend their independence. The island was devastated and impoverished by oppression and futile attempts at insurrection, especially in 1821. It was ceded to the viceroy of Egypt in 1880, and was restored to the Porte in 1841. A new insurrection broke out in 1868, and in 1866 began an almost general struggle of the Christian population against Turkish rule. In 1867 there were several important engagements between Omer Pasha, commanding the Turks, and the insurgents, and vigorous fighting at intervals from April to September, when, by order of the Turkish government, hostilities were suspended for four weeks. The Turkish grand vizier, Aali Pasha, arrived on the island Oct. 4, 1867, and proclaimed amnesty. The insurgents protested against amnesty, and demanded an international commission of inquiry and universal suffrage. Hostilities were renewed even before the expiration of the armistice. During the year attempts were made by negotiation to settle the difficulties. In January Mussulman and Christian delegates went, by order of the sultan, to Constantinople, to express the wishes of the people; but they effected nothing, and on May 3 went back to Crete, leaving a protest to the great powers. In June a collective note from France, Russia, Prussia, and Italy urged a suspension of hostilities, and an inquiry into the grievances of Crete by a joint commission of the powers and

the Porte; but the Turkish government refused the proposal. Another collective note from the same powers (Oct. 29) urged the same advice, and the English and Austrian ministers addressed separate notes advising liberal concessions to the Cretans. The Oretan assembly (November) asked for exemption for several years from imposts, establishment of banks to develop and foster agriculture, and other measures, all of which the Turkish government granted (Dec. 11). The grand vizier was recalled from Crete Feb. 11, 1868, and made an elaborate report on the insurrection. During that struggle the Greeks generally sympathized with the Oretans, which led to a grave complication between Turkey and Greece, afterward settled by a conference of the great powers meeting in Paris, Jan. 9, 1869. Finally, under the pressure of the great powers in favor of Turkey, the Oretan insurrection came to a close. The insurgent leaders submitted to the Turkish government in February, 1869; the Greek patriarch, in a pastoral, urged the Christian Cretans to peace; the island became tranquil, and the Porte in March reopened all the ports of Crete.—Since the last insurrection Candia, forming a vilayet, is governed by a pasha, who is military and civil governor, and has two councillors, one Turk and one Christian. It is divided into five provinces, viz.: Canea, under the immediate supervision of the governor general; Retimo and Candia, under Turkish pashas with one Christian councillor to each; and Sphakia and Lasiti, under Christian pashas with one Turkish councillor to each. The provinces are divided into 20 districts or *kaimakmics*, each of which sends to the general assembly four members, who are elected by the people. The assembly sits annually for 40 days, and is presided over by the governor general. The monthly expenses for civil service are 1,500,000 piastres, and the number of paid civil officials is 1,500. The military force consists of 16,000 regulars, stationed in the forts and blockhouses built since the insurrection on the smaller mountains, or near mountain passes, and a gendarmerie of 2,000 mounted men, who are couriers and patrols on the roads, and 3,000 men stationed in the towns and villages. The eight forts on the island built by the Venetians are in a dilapidated condition; a fort is now building (1873) on an island in Suda bay; and the naval force at this station consists of one frigate, two corvettes, and three steamers, under the command of a rear admiral. The prevailing religion is that of the Greek church, with an archbishop and six bishops.—See Hook's *Kreta* (Göttingen, 1823); Sieber's *Reise nach der Insel Kreta* (Leipsic, 1823); Pashley's "Travels in Crete" (2 vols. 8vo, London, 1837); Capt. Spratt's "Travels and Researches in Crete" (London, 1865); Melena, *Die Insel Kreta unter der Ottomanischen Verwaltung* (Vienna, 1867); and Bolanachi and Fazy, *Histoire de Crète* (2 vols., Paris, 1869). II. A town, called by the Greeks

Megalocastron, formerly the capital of the island, on the N. coast, 80 m. E. of Retimo and 60 m. E. by S. of Canea; pop. about 16,000, of whom more than half are Mohammedans. It is the seat of the Greek archbishop, and contains several churches, convents, and mosques, one of the latter being named after St. Catharine. The port is poor, and is so choked with sand that vessels of deep draught cannot enter. The fortifications, which are massive, are of Venetian construction, and ruins and other relics of Venetian sway in Candia are numerous. The streets are wide, paved, and shaded by trees; the houses, though not generally more than one story high above the ground floor, are well built, and fountains and fine gardens are frequent. There are some silk and cotton factories, but soap is the chief manufacture, and employs in its preparation a large part of the oil produced on the island. Candia is connected by telegraph with Rhodes, Mitylene, Cyprus, and the mainland. Not far from the town are the ruins of ancient Onosus. The Saracens founded Candia about 823, but for more than four centuries the Venetians had possession of it. In 1648 the city, then containing more than four times its present population, was blockaded by the Turks. It was assaulted, but in vain, in 1649 and in 1656, and the blockade was continued till 1667, when a regular siege began. During that period the Venetians were reinforced by auxiliaries from the order of Malta, the pope, the duke of Savoy, and Louis XIV.; but in September, 1669, having exhausted every resource, they surrendered. In the last three years of the blockade and siege about 80,000 Christians and 70,000 Turks were killed.

CANDIAC, Jean Louis Philippe Elisabeth Montcalm de, a precocious French child, a brother of the marquis de Montcalm, born at the château de Candiac, in the present department of Gard, Nov. 7, 1719, died in Paris, Oct. 8, 1726. The child possessed remarkable powers of memory, and is said to have been able to read French and Latin at the age of 8, and Greek and Hebrew at 6, and to have acquired some knowledge of arithmetic, heraldry, geography, and history. He died in his 7th year, from dropsy of the brain.

CANDIDO, Pietro (a name adopted in Italy for his real name, PIETER DE WITTE), a Flemish painter and sculptor, born at Bruges about 1545, died at Munich in 1628. In Italy he made many cartoons to be worked in tapestry for the grand duke of Tuscany. He afterward went by invitation of the elector of Bavaria to Munich. His principal paintings are of a religious character, as the "Annunciation," "Last Supper," "Christ with the Disciples at Emmaus," and "Holy Women at the Tomb of the Saviour." In Munich he painted a series of frescoes representing events in the life of Otho of Wittelsbach, which were whitewashed over, but were preserved in tapestries, and were engraved by Amling. His most celebra-

ted piece of statuary is the mausoleum of the emperor Louis IV. at Munich.

CANDLE, a small cylindrical body of tallow, wax, spermaceti, or other fatty substance, formed on a loosely twisted wick, used for a portable light. Although in the English translation of the Bible we find occasional mention of candlesticks, it appears that these were really lamps for burning olive oil, and not the supports for what we now call candles. Nor did the ancient Greeks and Romans possess any nearer approach to these useful inventions than the rude torches prepared by dipping strips of papyrus or rushes into pitch, and coating them with wax. In the middle ages, according to Fosbroke, this kind of candle was in use, some of them being of 50 lbs. weight, and containing a twisted tow wick. The tallow prepared from the fat of animals afterward came to be used for the manufacture of candles, and at a still later period the similar product, called spermaceti, of the fluid fat of the whale. The vegetable kingdom, too, has been largely drawn upon to furnish from its oils, as those of the palm especially, and of the cocoanut, a solid material for this same use. The mineral kingdom, at last, has been made to yield from the bituminous coals, in the substance paraffine, another excellent material for candles.—Common dipped candles have long been made by introducing wicks of cotton yarn into warm semi-fluid tallow, and, when they have become saturated, taking them out and suspending them by one end till the tallow cools; they are then dipped again, and again cooled, and so by each dipping accumulate more tallow, till they attain the required size. A mixture of mutton suet and beef fat is preferred to either alone. Instead of the old-fashioned method of dipping by hand, a simply contrived machine has been devised, consisting of an upright revolving post, which carries 12 horizontal arms, at the end of each of which is attached a frame of six rods; from each of these hang 18 wicks, making in all 1,296. As the post is turned round, each arm comes in succession over the reservoir of tallow. The frame upon it is arranged so that the wicks can be let down into the tallow. Thus one set after another receives an application of tallow, and is cooled as it revolves around, before its turn comes for another dip. When the weather is not very warm, the whole can be completed in about two hours. An improvement upon the dipping process was the substitution of cylindrical moulds of the size of a candle, made of tin or pewter, and a number of them arranged in a frame: moulds of glass have recently been substituted for those of metal. A wick is secured through the centre of each mould, the tallow is poured in, and the wick being stretched tight, they are set away to cool. Wax is often added to tallow, to give it greater hardness; and it is also at times introduced first into the moulds, and by turning these round made to line them entirely, leaving a smaller cylindrical cavity, into

which the tallow is afterward poured; the candle is thus made to have its exterior part of wax.—The greatest improvements in the manufacture of tallow candles have resulted from the investigations of M. Chevreul into the composition of animal and vegetable oils and fats. In 1818 he announced the discovery that most of these bodies consist of a number of compounds of different acids with one base, which he called glycerine. Combined with stearic acid, it forms stearine; with oleic acid, oleine; and with palmitic acid, palmitine. These bodies are called glycerides. Oleic acid is a thick oil, which, according to its proportion in combination with the other solid acids, gives fluidity to the mass, and the tendency to run in the candles. Glycerine, the base, is a sweet syrupy substance, which adds little to the inflammability of the stearic and margaric acids with which it combines. By removing it from these acids, and then expressing from them the oleine, an excellent material for candles is obtained, hard and firm, and almost equal to those made of spermaceti.—The best candles in general use in this country are made of spermaceti. This substance, which is fluid in the whale, becomes when taken from the animal a white crystalline mass, composed of a liquid oil and a solid matter, which is the pure spermaceti. The oil is removed by first straining off so much as will pass through the bags used as filters. The sperm is next placed in hempen bags and subjected to machine pressure. After this the substance is reduced to powder, placed in other bags, and pressed much more powerfully than before. The spermaceti cakes are next melted and boiled with a soda ley, just sufficient in quantity to form a soap with the oil in the sperm, without acting upon the solid matter. The soap floating upon the surface is skimmed off, and the sperm is set to crystallize in moulds; only, however, to be again ground, pressed, boiled with an alkaline ley, washed with water, and moulded into blocks. From these blocks the candles are moulded as may be convenient. The moulds require to be heated to the temperature of the melted sperm, and slowly cooled after filling to prevent crystallization of the material, and the same precaution is required with stearic acid candles. The English are in the habit of adding about 3 per cent. of wax, which answers the same purpose of preventing the material from assuming the brittle, crystalline structure. They, and the French also, sometimes introduce coloring matters into the candles, in so small quantity as not to destroy their beautiful transparency, nor to affect the brilliancy of their light. Gamboge gives to them a yellow tint like wax; chromate of lead is used in France for this color, carmine for red, and Prussian blue for blue.—Wax candles are now little used compared with the other kinds. They are made by dipping, and by pouring the melted wax over the wicks. The shape is given during the process and at its close by rolling the candles between marble

slabs. The candles are sometimes shaped by drawing them through a machine made for the purpose, as wire is drawn. There is a difficulty in moulding wax candles, owing to the substance adhering to the interior surface of the mould. Moulds of glass, however, have been successfully used, greater strength and security being given to them by incasing each one in a tube of gutta percha. By dipping them for an instant in hot water, the glass expands sufficiently to free the candle, which should be extracted as the mould comes out of the water. Wax requires smaller wicks than other candles, and they should be made of twisted Turkey cotton unbleached. The large wax candles used in Roman Catholic churches are made by rolling a sheet of wax placed upon a slab over the wick laid down upon it, and then giving shape to them by rolling in the usual way between marble slabs. Coloring matters similar to those used for coloring spermaceti candles may first be melted into the wax.—Paraffine candles are not yet prepared upon a large scale, but the practicability of obtaining from bituminous coals a large amount of oil from which this beautiful material for candles may be extracted, has been fully established. It is a true chemical compound of carbon and hydrogen, in those atomic proportions which appear most suitable for producing the best light.—Candle wicks have been the subject of special attention on the part of the manufacturers. It is found that the more perfect the wick, and the better adapted it is to the particular kind of candle, the more brilliant is the light and the less the consumption of material. The coarse threads used for tallow candles raise the melted grease to very little height, and are soon covered with a burr of carbonaceous matter, which must be removed by frequent snuffing. Wicks of finer threads have a greater capillary action, and require less snuffing. So long as the threads of the wick remain in the body of the flame, they are protected from the action of the oxygen of the air, and the material is charred without being consumed. By turning the top of the wick to one side, so as to project from the flame, the light is no longer obscured by this burr, which soon disappears by its combining with oxygen. The plaited or braided wicks were contrived to effect this result, the plaits opening at the top and spreading out to the edge of the flame. A twist has been given to wicks by winding them around a cylinder, and in this state saturating them with the melted material; after being drawn out and stretched in the candle, they still retain the tendency to assume the spiral form, and as the candle is consumed, the end of the wick coils out from the flame and is burned without obstructing the light. Wicks made of two parts twisted in opposite directions and wrapped around with a fine thread are also used. Other expedients have been devised to effect the same purpose; and ingenious and expensive machinery is in use in

large candle factories for the manufacture of wicks alone.

CANDLEMAS, the Roman Catholic festival of the purification of the Virgin Mary, Feb. 2, so called because the tapers and candles used in the church throughout the year are consecrated on this day. The festival is of great antiquity.

CANDLENUT (*aleurites triloba*), a tree of the family *euphorbiaceae*. Flowers showy, in thyrsi; fruit a nut about two inches in diameter. It is 20 to 30 ft. high, wide-spreading, the leaf trilobed or near the ends of the branches, entire, of a light green color. The wood is soft and easily worked. The inner nut has a very hard shell, within which the meat is often preserved for many years; it is good eating, but rather rich; the oil is easily expressed, and



Candlenut—Leaves and Flowers.

is imported into England for candle making. As a drying oil it ranks among the best, and commands about the same price as sesame or rape oil. The tree is cultivated or grows wild throughout the Pacific islands, India, Japan, and S. E. Asia. The Hawaiians string the kernels of the nuts on slender strips of bamboo, and light them as candles; they burn well and clearly, with a peculiar but pleasant odor.

CANDLISH, Robert Smith, D. D., a Scottish clergyman, born in Edinburgh, March 28, 1807. He was educated at Glasgow, was private tutor at Eton, and in 1829 became minister of St. Andrew's, Glasgow, and subsequently at Bonhill, whence he was transferred to the parish of St. George, Edinburgh. In 1839 he took a prominent part in the debates of the Scottish general assembly; and when the disruption occurred in 1848 he left the kirk for the Free church, of which in 1846 he was appointed convener. In 1847 he succeeded Dr. Ohalmers as professor of divinity in New college, Edinburgh, of which he subsequently became principal. He has written several works, mostly expositions of the Bible, and has been a frequent contributor to religious periodicals.

cals. He is specially known as one of the leaders and the historian of the Free church movement in Scotland.

CANDOLLE. I. Augustin Pyramus de, a Swiss botanist, born in Geneva, Feb. 4, 1778, died there, Sept. 9, 1841. Up to the age of 16 poetry and literature were his favorite studies; but subsequently he devoted himself to the study of natural history, especially of botany, which became his favorite pursuit. In 1799 he commenced the publication of the *Histoire des plantes grasses*, of which the 4th and last volume appeared in 1808. In 1802 he became assistant professor to Cuvier at the collège de France, and was elected honorary professor of natural history at the academy of Geneva. In 1808 his notable essay *Sur la fertilisation des dunes* appeared in the *Annales de l'agriculture française*; and in 1804, upon receiving his degree of doctor of medicine, he published an *Essai sur les propriétés médicinales des plantes*. He also prepared a sketch of his lectures for Lamarck's third edition of *La flore française*, which was enriched by 6,000 additional species of plants accurately described, a table of synonymous botanical terms, a botanical synopsis, and all the additions and emendations required by the new developments of vegetable anatomy and physiology. The work was not completed till 1816, but the appearance of the first volumes placed De Candolle in the foremost ranks of botanical science. In 1806 he was commissioned to visit all the provinces of the French empire, then including Belgium, northern Italy, and the countries on the Rhine, and report upon their agricultural condition. Six years were devoted to this task, and six successive reports, embodying the results of his observations, were published in the memoirs of the agricultural society of the department of the Seine. In 1807 he became professor of botany in the medical faculty of Montpellier, and in 1810 was appointed to the same chair in the faculty of sciences. In 1818 he published the *Théorie élémentaire de la botanique* (3d ed. by his son, Alphonse de Candolle, 1844), a work remarkable for its profound analysis and scientific views of method, which was translated into German, English, and Spanish. In 1815 he was appointed rector of the university of Montpellier; but he resigned and returned to Geneva, where a chair of natural history and a botanical garden were established especially for him. In 1818 he began the publication of the *Regni Vegetabilis Systema Naturale*. Two volumes only of this gigantic work appeared; but he continued the same plan in a modified form, in his *Prodromus Systematis Regni Vegetabilis, seu Enumeratio Methodica Ordinum, Generum, Specierumque*, &c., which appeared in Paris in 1824 and following years. After his death this elaborate work was continued by his son, assisted by other able botanists, the 15th volume being completed in 1866. Besides the works already named, he published a number of other books

and dissertations. De Candolle was not only distinguished as a botanist, but also as a citizen. His *Rapport sur les magasins de subsistance* contains many luminous ideas on political economy. II. Alphonse Louis Pierre Pyramus de, son of the preceding, born in Paris, Oct. 27, 1806. He received his diploma as doctor of law at Geneva in 1829; but devoting himself to botany, he assisted his father, and on his death in 1841 succeeded him for 18 years as professor at the academy of Geneva, and was at the same time director of the botanical garden. He was elected corresponding member of the French academy in 1851. Besides his continuation of his father's *Prodromus*, he has published *Géographie botanique raisonnée* (2 vols. 1855), *Histoire des sciences et des savants depuis de Candolle* (Geneva, 1878), &c.

CANDY, Candi, or Kandy (Cingalese, *Makur Nuwara*, great city), a town of Ceylon, capital of a kingdom of the same name till 1815, when it came into possession of the British. It stands on the shore of an artificial lake in an amphitheatre of beautifully wooded hills near the centre of the island, 80 m. E. N. E. of Colombo, and 95 m. S. W. of Trincomalee; pop. about 8,000. The residence of the British governor here is the finest edifice in Ceylon; and besides this the town contains the residence of the major general, the king's palace, a Buddhist temple, several churches of various denominations, and a number of other notable buildings. In the centre of the lake is a military magazine, and just outside the town a royal cemetery, containing the remains of a long line of native kings and heroes. The lake of Candi, which was formed by the last king and is 1,680 ft. above the sea, is a beautiful sheet of water, about 1½ m. in length, and from 100 to 500 yards in breadth.

CANE. See BAMBOO, and SUGAR.

CANE, or *Kem*, a river of Bundelcund, India. It rises at an elevation of 1,700 ft. above the sea in lat. 23° 54' N., lon. 80° 13' E., and for 35 m. from its source takes a N. E. course, when it falls in a cataract over the N. brow of the Bandair range. After a sharp bend to the W. it turns again to the N. E., and pursues that general course until it empties into the Jumna at Chilatar. Its length is about 250 m. Rapids and cataracts make the greater part of its course unnavigable.

CANE I. DELLA SCALA, surnamed the Great, popularly known as Can Grande or Cangrande (i. e., great dog, a name supposed to be derived from the figures of mastiffs in the armorial bearings of the family), an Italian ruler and warrior, celebrated by his friendship for Dante, born in Verona in 1291, died in Treviso, July 22, 1329. The scion of an illustrious local dynasty, he acquired greater renown than any of his kinsmen in the capacity of podestà or sovereign prince of Verona, as successor of his brother Alboino (Jan. 1, 1312). Having previously taken Vicenza from the Guelphs of Padua, he made them sign a treaty (1314) by

which they waived all claims on the former city; and on their renewing hostilities in 1317 he repulsed them and seized one of their principal fortresses. His success led to his appointment by the league of Lombardy (Dec. 16, 1318) as captain general of the Ghibelline forces, and to his being excommunicated in 1320 by the pope. He gained victory after victory, and forced Padua to surrender; but in 1329 he was taken ill in the streets of Treviso, while making his triumphal entry into that city, and had to be removed to the cathedral, where he died. His remains were transferred to Verona, where his tomb, executed by Bonino di Compione, forms a species of portal to the church of Santa Maria Antica, near the piazza dei Signori, and in the vicinity of the other tombs known as those of the Scaligers. His court combined military splendor with magnificent hospitalities to men of genius and exiles, and was celebrated as the most brilliant social and political centre of the period. He was especially kind to poets and artists, and wrote some poetry. Dante, after leaving Lucca in November, 1314, found a sympathetic asylum in Can Grande's palace till 1318; and he, as well as Petrarch, and in more modern times Voltaire, paid warm tributes to the podestà's character. There is no nobler passage in the *Paradiso* than that (canto xviii.) relating to Cane and the poet's long-standing and very intimate relations with him. One of the most elaborate letters of Dante is addressed to him, explanatory of the scope of the *Divina Commedia* and the method of its interpretation. Cangrande was succeeded by his nephew Alberto II.—The claim of the philosopher Scaliger to descent from the same family is not sustained by competent authorities. (See SCALIA, and SCALIGER.)

CANE BRAKE, a term applied to the extensive



Cane Brake Grass (*Arundinaria macrosperma*).

growths of the *arundinaria macrosperma*, the most gigantic of the grasses, which occur in

the southern portions of the United States, and are to be found covering vast extents of country in the alluvial bottoms of Central and South America. The plant is not unfamiliar in the temperate zones, as its stalks are much used for fishing rods. In descending the Ohio river the early voyagers met with the first indications of cane at the mouth of the Big Sandy, which forms the dividing line between Kentucky and Virginia. The cane, however, has disappeared from that region, having been destroyed by the cattle and the encroachments of civilization; but for many years after the settlement of Tennessee and Kentucky it furnished abundant food for cattle, where now it is hardly known even through tradition. Cane brakes are indicative of rich land, as they are only to be found in perfection in the most fertile soils, where, having obtained a foothold, by their more rapid growth they usurp the place of the timber. In the southern portions of the United States the plant often reaches the height of 15 and 18 ft., with a base of 1 to 1½ in. diameter. In more southern latitudes it is very much larger. It grows as straight as an arrow from the root, tapering off finally in a beautiful, thread-like, feathery top. Cane brakes are often many miles in extent, always lessening in density as they reach the high ground. They are very difficult to penetrate, and are favorite haunts for all kinds of game, which seek their solitudes either for protection or for the leaves for food. The deer and bear are particularly fond of the young green leaves, and upon them often become exceedingly fat. The cane stalks being hollow, having no pith, and being divided inside every few inches into sections, are very combustible when dried in the sun; and the air confined within the hollow sections, warming by the external heat, explodes with considerable force, so that a cane brake on fire sounds like a continued roar of musketry.

CANEA, or **Khania**, the principal seaport of the island of Candia or Crete, on the N. coast of Candia, 80 m. W. N. W. of Retimo and 60 m. W. by N. of Candia; pop. about 10,000, of whom 8,500 are Mohammedans. The town is surrounded by strong walls and deep ditches, which are in a very neglected condition. The harbor is not good, being exposed to N. winds, but was formerly the best of the island. It has several Greek churches, Mohammedan mosques, a Catholic church, and a Jewish synagogue. In 1869 an agricultural bank was established by the Turkish authorities, and a tract of land set apart for a model farm. There are several schools, among which is a normal school, established in 1871, under French teachers. The imports in 1870 amounted to \$1,046,100, the principal articles being flour, grain, and manufactured articles; the exports amounted to \$1,596,100, consisting almost entirely of soap, olive oil, and silk.—Canea is supposed to be the ancient Cydonia. It came into the posses-



Canea.

sion of the Turks in 1645. It suffered considerably by the earthquake of October, 1856, and was the scene of a bloody riot against the Christians in 1858.

CANGA-ARGUELLES, José, a Spanish statesman, born in Asturias in 1770, died in 1843. He was deputy from Valencia to the cortes of 1812. After the revolution of 1820 he was appointed finance minister. While in this office he presented to the cortes a report on the church and state property of Spain, and a paper on the condition of the Spanish revenue, in which he showed the insufficiency of the national income to meet current expenses. He proposed an immediate loan, and to sell one seventh of the ecclesiastical property, together with the small possessions in Africa, and to levy indirect taxes. These proposals created sharp discussions, and were adopted only in part, and he retired from the ministry. When the constitution was suppressed he fled to England, where he wrote *Elementos de la ciencia de hacienda* (8vo, London, 1825); *Diccionario de hacienda, para el uso de la suprema direccion de ella* (5 vols. 8vo, London, 1827-'8); and *Observaciones sobre la guerra de la Peninsula*, in which he disputed the current English assertions that the success of the Spanish war for independence was mainly owing to the British armies. He returned to Spain in 1829, and was appointed keeper of the archives at Simancas, where he began a history of Spain from the earliest times.

CANGE, Du. See DU CANGE.

CANIBAS, a tribe of the Abenaki nation on the Kennebec river, and by some called the real Abenakis. (See ABENAKIS.)

CANICATTI, a town of Sicily, in the province and 14 m. N. E. of Girgenti, on the river Naro; pop. about 20,000. In the vicinity are extensive mines of sulphur.

CANICULA. See DOG STAR.

CANINA, Luigi, an Italian archæologist and architect, born in Casale in 1795, died in Florence, Oct. 17, 1856. He was for several years professor of architecture in Turin, conducted the excavations at Tusculum in 1839, and those of the Appian way in 1848, and wrote on them

and also on church architecture, the topography of Rome, and kindred subjects.

CANINI, Giovanni Angelo, an Italian painter and engraver, born in Rome about 1620, died in 1666. He was a pupil of Domenichino, and his martyrdom of St. Stephen and of St. Bartholomew are two admirable altarpieces in the church of St. Martin, Rome.

CANINO, Prince of. See BONAPARTE, LUCY.

CANIS. I. Canis Major, a southern constellation containing Sirius, or the dog star. It is situated below the foot of Orion, and contains 31 stars. **II. Canis Minor**, a northern constellation, whose appearance in the morning twilight gave the Egyptians notice of the approach of dog days. It is near Canis Major, and contains 14 stars, of which Procyon is the principal.

CANISIUS, Petrus, a Dutch Jesuit, born at Nimeguen, May 8, 1521, died at Fribourg in Switzerland, Dec. 21, 1597. He Latinized his original name of De Hondt (the dog). He took a prominent part in the council of Trent in 1545, was selected by the emperor Ferdinand I. for his preacher, and was the first to hold the office of provincial or ecclesiastical governor of the Jesuits in Germany. He contributed powerfully in spreading the influence of the order in that country, and established Jesuit colleges at Prague in Bohemia, at Fribourg in Switzerland, and at Augsburg and Dillingen in Bavaria. He was the author of a larger and a smaller catechism. The best edition of the former is that of Antwerp of 1587, and the most recent edition that of Landsbut of 1842. The smaller catechism (*Institutiones Christianæ Pietatis, sive Parvus Catechismus Catholicorum*) has passed through more than 100 editions since its publication in 1566, and has been translated into most modern languages.

CANITZ, Friedrich Rudolf Ludwig, baron, a German poet and diplomatist, born in Berlin, Nov. 27, 1654, died there, Aug. 16, 1699. He belonged to an ancient Brandenburg family, studied jurisprudence at Leyden and Leipsic, travelled in France, England, and Italy, and after 1677 was employed in many important diplomatic missions. He survived his wife, Dorothea or Doris von Arnim, four years. The

remarkable character of this lady has been eulogized by Varnhagen von Ense and Franz Horn, and Canitz's poem on occasion of her death and two of his religious poems are among his most popular effusions. He excelled in satirical and didactic poetry. A selection of his works is in the *Bibliothek der deutschen Dichter des 17. Jahrhunderts* (Leipsic, 1838).

CANKER, a form of apthous ulceration of the mucous membrane of the mouth, most commonly seen in children, and usually connected with derangement of the digestive apparatus. The ulcers are small, circular, superficial, filled with a white thick exudation, sometimes surrounded by a circle of inflammation, and very sensitive; they originate in small, hard, red, and painful prominences, which are soon changed into vesicles, whence the name "vesicular stomatitis." When the ulcers are few in number they quickly disappear, their cicatrization being hastened by astringent or caustic applications, and by the exhibition of gentle aperients. In unhealthy children the ulcers are apt to be confluent, and tend to spread to the œsophagus and stomach; in such cases there may be considerable constitutional disturbances, requiring tonics and alteratives. The predisposing cause of apthæ is anything that enfeebles the system, and the exciting cause any irritation in the mouth from foreign bodies, decaying teeth, or acrid food. The usual seat is on the inside of the lower lip and cheeks, and on the tongue, though they may occur on almost any part of the mucous membrane. Billard represents them as ulcerations of the muciparous glands or follicles, but in many cases they are too superficial to admit of this explanation. When they occur in debilitated constitutions, in the course of other diseases, they form a painful and dangerous complication, from their liability to extend and to take on a gangrenous aspect. They are generally only a local affection, and require for their removal only local applications. The best of these are nitrate of silver, applied either in the solid form or in solution, and borate of soda, which is often used dissolved in honey. Internal remedies are rarely required. The return of the ulcers may be prevented by attention to the general rules of hygiene, and especially to the diet, which should be simple, nutritious, and easily digested.

CANKER WORM, the caterpillar of a nocturnal lepidopterous insect, or moth, of the family *geometra*, Linn. (or *phalanites*, Lat.), of the group *hybernidae*, and the genus *anisopteryx*. In the moths from which canker worms are produced the females are wingless. The males have antennæ with a downy edging on each side; the wings are large and silky, and when at rest the fore wings entirely cover the hind wings; the fore wings are ash-colored, with a whitish spot on the front edge near the tip, and two irregular white bands crossing them, with black dots along the sides and outer margin; the hind wings are pale ash, with a blackish dot

near the middle; the expanse of wings is about $1\frac{1}{2}$ inch. This is the common American species, which is smaller and darker than the European, and is the *A. vernata* (Peck); there



Canker Worm.—1. Adult Male. 2. Larva. 3. Adult Female. 4. Cluster of Eggs.

is a smaller species, without the whitish bands and spots, the *A. pometaria* (Harris). These moths usually come out of the ground about the middle of March, sometimes a little earlier or later, according to the season, and continue to rise for about three weeks; in mild winters they have been seen in every month from October to March; the females are most numerous in autumn and winter, and the males most abundant in the spring. The wingless females creep up the trunks of the nearest trees, and are followed in a few days by the males, when the pairing takes place; the eggs are placed on the branches in clusters of 60 to 100, the number usually laid by each female, and are attached by a water-proof varnish; soon after this the insect dies. The eggs are hatched from the 1st to the middle of May, at the time when the red currant blossoms and the young leaves of the apple begin to start; the young worms gather upon the tender leaves, and creep into the buds and flowers; at first they make but small holes, but at last devour all the pulpy part of the leaves of the apple, elm, cherry, plum, lime, and other native and cultivated trees. The worms vary considerably in color within the limits of the same species; when very young they are of a blackish brown color, with a yellowish stripe on each side, the belly whitish, and two bands of this color across the head; when fully grown they become ash-colored on the back, black on the sides with a pale yellowish line below it; some are dull greenish yellow, others green with two white stripes on the back, and others clay-colored; when full-grown they are nearly an inch in length. After eating for about four weeks, they begin to quit the trees on which they have fed; some creep down, but most let

themselves down from the branches by threads; they burrow immediately into the earth, from two to six inches in depth, according to the nature of the soil; they make little cavities in the earth by turning themselves round, and are changed into chrysalids within 24 hours, those of the females being the largest; the chrysalis state may continue till the following spring, or it may cease in mild weather in the autumn. They come out of the ground mostly in the night. Nature seems to desire to confine the canker worms to a limited space, as the females have no wings, and bury themselves within the spread of the trees from which they descend; but accidents have extended them to remote localities. The canker worm has ten legs, six anterior jointed ones, and four fleshy prop legs behind; they are called span worms and loopers from their singular mode of progression; from the absence of the three intermediate pairs of prop legs in the centre of the body, when creeping they arch up the back and bring forward the hind part of the body, and then, resting on their prop legs, they stretch out to their full length in a straight line, and so repeat the spanning process.—The ravages of canker worms are not very apparent till June, when they are most voracious; but then the leafless and apparently withered fruit trees and elms afford a melancholy spectacle. The best way of destroying the canker worm is to prevent the females from ascending trees to deposit their eggs; various methods have been resorted to for this purpose, consisting in the application of viscid substances to the trunk, immediately on the bark or on strips of cloth, paper, or board; tar is generally used, and it should be applied from November, and renewed daily as long as the insects come forth; tin troughs filled with cheap oil a few feet above the ground have been tried with success on a small scale; melted india rubber has been recommended in England. When the worms are on the leaves, they may be destroyed on small and choice trees by dusting air-slacked lime on them when wet with dew. Showering with a mixture of whale-oil soap in water, in the proportion of one pound to seven gallons, will kill the worms without injuring the leaves or the fruit. By jarring the limbs many worms will descend with their silken threads and may be easily killed. After they have entered the ground, they may be killed by digging or ploughing under the trees, scattering a few grains of corn, and turning a few hogs into the orchard; these animals will root up and devour the chrysalids, and will crush many with their feet. Canker worms are eaten by many species of birds; ground beetles also devour them; the potter wasp fills her clay cells with them as food for her young; ichneumon flies deposit their eggs in them, and the little maggots thence arising feed upon their substance; even their eggs are pierced by a small four-winged fly, sometimes every one in a cluster being thus rendered abortive.

No doubt beast, bird, and insect would be enough to keep the canker worms within their natural limits; but since the felling of the forests in which they naturally dwell, and the persecution of insectivorous birds which devour them, the worms seem to have increased in spite of all man's destructive ingenuity. In our northern cities the best remedy for them yet found has been the introduction of English sparrows, which seem to have almost exterminated them.—For fuller information on these pests, and the best means of destroying them, see Harris's "Insects injurious to Vegetation."

CANNABIS INDICA. See HEMP.

CANNÆ, a town of ancient Apulia, in Italy, on the S. bank of the river Aufidus (Ofanto), about 6 m. from its mouth in the Adriatic, and about 8 m. N. E. of the ancient Canusium. Near it, and probably on the N. bank of the river (though this is a point much disputed among historians), the Romans experienced on Aug. 2, 216 B. C., the most disastrous of all their defeats at the hands of Hannibal. The Carthaginian leader had spent the preceding winter and spring at Geronium; but the scarcity of provisions induced him to move further south to Cannæ, where he surprised the guard, captured the Roman magazines of supplies, and established his headquarters for the harvest season. The Romans had employed the spring in raising a new and very large army, and the consuls for the year, L. Æmilius Paulus and C. Terentius Varro, now advanced against the Carthaginians with nearly 90,000 men, a force greatly superior to that of Hannibal. Æmilius, pursuing the policy of Fabius Maximus, was unwilling, in spite of this advantage, to risk an open conflict; but he and Varro commanded on alternate days, and the latter insisted on engaging the enemy. The armies accordingly joined battle in the plains near the town. The superiority of Hannibal's cavalry and the skill of his light-armed foot soldiers turned the advantage at once against the Romans, and their troops, forced by Hannibal to take up a position with their faces toward the sun, and toward a fierce wind which blew the dust against them, were thrown into confusion, almost surrounded, and completely cut to pieces. Hannibal's loss was insignificant. Varro in part atoned for his rashness by skilfully conducting the retreat of the remnant of the army to Canusium. Æmilius fell in the battle.—The ancient name is represented by the modern Canne, a small town on its site, where a few Roman remains still exist.

CANNEL COAL. See COAL.

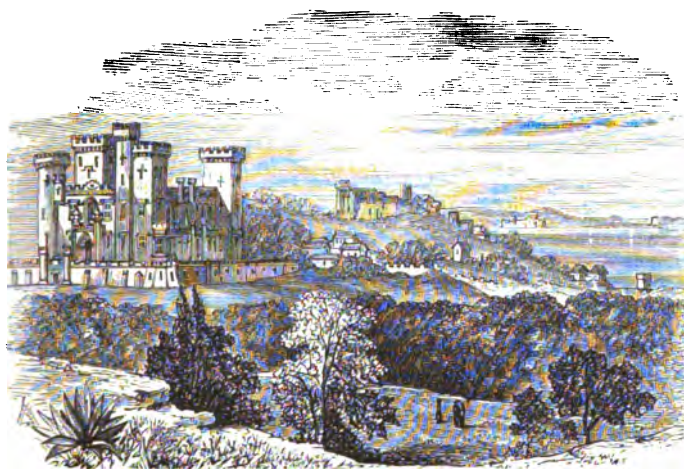
CANNELTON, a town of Perry county, Ind., on the Ohio river, 145 m. below Cincinnati; pop. in 1870, 2,481. It contains several churches and schools, a newspaper, and some fine residences. The Cannelton cotton mill employs several hundred operatives, and manufactures 40,000 yards of sheetings per week. The factory, which is 300 ft. long and four stories high, is built of variegated sandstone, and

presents a splendid appearance from the river. In the hills which surround the town are found beds of cannel coal, lying in nearly horizontal strata 4 or 5 ft. thick, and easily accessible. Fire clay, limestone, and fine sandstone for building purposes are found interstratified with the coal. Before the establishment of the American cannel coal company, which was incorporated in 1836, Cannelton contained only four or five log cabins.

CANNES, a seaport of France, department of Alpes-Maritimes, on the Mediterranean, 15 m. S. W. of Nice; pop. in 1866, 9,618. The climate is unhealthy in the summer, but in the winter it is a favorite resort for invalids from England and the north of France. Napoleon landed here on his return from Elba, March 1, 1815. Up to 1837 Cannes was a poor fishing village, but in that year Lord Brougham took up his residence here, and contributed greatly

and edited the "Microcosm," a school periodical. From Eton he went in 1787 to Christ Church, Oxford, where he gained several prizes for Latin poetry, and took a high position as an orator. From Oxford he went to Lincoln's Inn to study for the bar; but by the advice of Sheridan, Burke, Fox, Grey, and other whigs, he turned his attention to politics, coming out, however, as a tory, and entering parliament (1798) under the auspices of Pitt. He did not address the house till the following year (January, 1794), when he at once made a marked impression. In 1796 he took office as under secretary of state; in 1797 he began with others the publication of the political paper, the "Anti-Jacobin;" in 1798 he engaged in Wilberforce's plan for the abolition of the slave trade; in 1799 he was appointed one of the commissioners for managing the affairs of India; in 1800 he married Joanna, youngest

daughter of Gen. John Scott, with a fortune of £100,000; and in 1801, on the dissolution of Pitt's cabinet, he retired from office. On Pitt's return to office in 1804 he was made treasurer of the navy. After a brief retirement in 1806, occasioned by the death of Pitt, he reappeared in office in 1807, as secretary of state for foreign affairs, in the duke of Portland's cabinet, and distinguished himself by his state papers. In 1809 he was involved in a quarrel with one of his colleagues, Lord Castlereagh, which led to a duel, and afterward



Château de St. Ursula at Cannes.

to the growth of the town. He died here, May 7, 1868, and was buried in the cemetery, his grave being marked by a large granite cross. Opposite the town is the island of Ste. Marguerite, in the citadel of which the "man in the iron mask" was confined from 1686 to 1698. The surrounding country is fruitful in vines, olives, and oranges, and a brisk trade is carried on in fruits, sardines, and anchovies.

CANNING. **I. George**, a British statesman, born in London, April 11, 1770, died at Chiswick, Aug. 8, 1827. His father, a London barrister of an ancient family, was disinherited upon his marriage with Miss Mary Anne Costello in 1768, and died shortly before the birth of his son. His mother went upon the stage, where she met with little success. He was sent to Eton at the expense of his uncle, Stratford Canning, a London merchant, father of Stratford Canning, afterward Viscount Stratford de Redcliffe. He manifested decided literary talent, wrote a poem on the "Slavery of Greece,"

to the resignation of both and the dissolution of the cabinet. During the session of 1812 he advocated the Catholic emancipation bill, introduced by Mr. Grattan. After parliament was dissolved in 1812 he was returned from Liverpool, and again in 1814, 1818, and 1820. In 1814 he was sent as ambassador to Portugal; in 1816 he became president of the board of control; and in 1820, to avoid participating in the trial of Queen Caroline, he resigned his place and travelled upon the continent. In 1822 he was named governor general of India, and was preparing to leave England, when the suicide of Lord Castlereagh recalled him to the post of secretary of state for foreign affairs (Sept. 16, 1822). While in this position, in 1825, in defiance of the policy of the holy alliance, he resolved to recognize the independence of, and open diplomatic intercourse with, the several South American republics, and soon carried his intention into effect. In 1827 he was made premier, but when the appoint-

ment was announced Lord Chancellor Eldon, the duke of Wellington, Lord Bexley, Viscount Melville, Robert Peel, and others, resigned, and compelled him to solicit an alliance with the whigs. He was supported by Mr. Brougham, Sir Francis Burdett, and Mr. Tierney, but had to sustain a most formidable opposition. Declaring himself, finally, inimical to parliamentary reform, and to the repeal of the test and corporation acts, he was left without a party, and it was the vigor of his foreign policy alone which kept him in position. He spoke for the last time on June 27, 1827, and the next month signed the treaty between England, France, and Russia, for the settlement of the affairs of Greece. He then retired for a change of air to the duke of Devonshire's villa at Chiswick, where he died. He was buried in Westminster abbey, his tomb being close by that of Pitt. His oratorical abilities were of a high order, and his poetical talent not inconsiderable. Among his more marked speeches were one against making peace with the French republic (1798); several in defence of the ex-ministry (1801-'5); in favor of Catholic emancipation (1812); in favor of the recognition of the new governments in Spanish South America (1825-'6); and against the repeal of the test and corporation acts (1827). His "Speeches," with a memoir by R. Therry, have been published (6 vols. 8vo, London, 1828); and his poems, which are remarkable for wit and point, are given in the "Poetry of the Anti-Jacobin" (enlarged ed., London, 1854 and 1858). II. **Charles John**, viscount and earl, a British statesman, son of the preceding, born at Brompton, Dec. 14, 1812, died in London, June 17, 1862. He was educated at Christ Church, Oxford, where in 1833 he took a first class in classics and a second class in mathematics. In 1836 he represented Warwick in the house of commons; and in March, 1837, after his mother's death (on whom the peerage was conferred in 1828), he took his seat in the house of lords as Viscount Canning. In 1841 he was made under secretary of state for foreign affairs, and in 1842 chief commissioner of woods and forests. He took a prominent part in the great industrial exhibition of 1851, and in 1853 became postmaster general, with a seat in the cabinet, under the Aberdeen administration. On the resignation of Lord Dalhousie in 1855 he was appointed governor general of India. The sepoy mutiny broke out during his administration, and he was as much censured for his leniency at the beginning of the outbreak as for his severity afterward. His proclamation confiscating the lands of the talookdars of Oude elicited a strong condemnatory counter-despatch from Lord Ellenborough, president of the board of control, and was vetoed by the home government. His subsequent conciliatory course did so much toward the pacification of India, that in April, 1859, he received the thanks of both houses of parliament. He was raised to the earldom of

Canning, May 21, 1859, and was made knight of the garter, May 21, 1862. He died without issue, and the title became extinct. In 1871 a statue of him, by Foley, was erected in Westminster abbey. III. **Stratford**. See STRATFORD DE REDCLIFFE.

CANNON, a heavy implement used to set projectiles in motion by means of the explosion of gunpowder. Its general form is that of a tube closed at one end. The term is applied to all heavy firearms which are discharged from carriages, in contradistinction to small arms which are discharged from the hand or shoulder. The introduction of cannon followed the invention of gunpowder. The first used were conical, and resembled an apothecary's mortar internally and externally. They were called mortars, bombards, and vases; they were fired at high angles, and in consequence of the slow combustion of the gunpowder of that day, the stone missiles which they threw moved with little velocity. (See ARTILLERY.) To economize the action of the powder, and to give greater accuracy to the fire, the bore was afterward made nearly cylindrical, and from four to eight calibres long, terminating at the bottom in a very narrow and deep chamber, the object of which was to increase the effect of the powder by retarding the escape of the gas. These cannon were further improved by making the bores perfectly cylindrical, and were called *perrières*, from the fact that they fired stone balls. The first bombards were made of bars of iron bound together by hoops; they were afterward made of wrought iron, and finally of cast metals, bronze, iron, and steel. Bronze cannon were used in the time of John the Good of France (1350-'64). Cannon loaded at the breech were among the earliest forms introduced, but they were abandoned for want of strength in the mechanism. The introduction of cast-iron projectiles led to the invention of a new kind of cannon called *culverins*, the shape

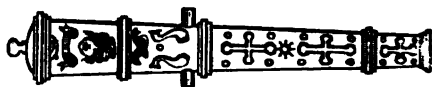


FIG. 1.—Culverin.

and appearance of which were very similar to those of the guns now in use. The great strength of these cannon and their projectiles permitted the use of larger charges of gunpowder, and marked an important step in the improvement of artillery. The idea prevailed among ancient artillerists that the range increased with the length of the piece, and consequently many culverins of enormous length were cast. A remarkable piece of this kind, familiarly known as "Queen Anne's pocket piece," is still to be seen at Dover, England. It is 25 ft. long, and carries a ball weighing only 25 lbs. In 1478 an attempt was made to use mortars for throwing hollow projectiles filled with powder, to which was attached a

burning match for the purpose of setting the powder on fire; but this practice was abandoned for a time, owing to the rudeness of the methods, and the frequency of accidents resulting therefrom. Means were however devised in 1684 for overcoming the difficulties which had been encountered, and for perfecting the manufacture and use of mortars. They are now in use throughout the world, and owing to the great improvements which have been made in constructing armored ships and fortifications, so as to render them proof against direct fire, mortars and mortar or vertical firing are attracting special attention from artilleryists and engineers. In the time of Louis XIV. a great variety of mortars were used, some of which, called Comminges after their inventor, threw projectiles weighing as much as 550 lbs. During our civil war, wooden mortars of the most primitive kind, made of logs bored or burnt out, and with very light charges at close range, were used effectually by the Union troops at Vicksburg, for throwing grenades and small shells into the enemy's lines. Thirteen-inch mortars of cast iron were used also in the siege of Fort Pulaski and the attack upon the forts below New Orleans, while those of a smaller calibre were used at the siege of Petersburg, under the direction of Gen. H. L. Abbott, in pursuance of an idea suggested by Maj. Gen. Bormann, of the Belgian service. He proposed to convert a 10-inch mortar shell into a spherical case shot, by filling it with balls and a bursting charge sufficient to rupture the shell, the fuse to be so timed as to explode the charge about 50 ft. from the ground. The expedient was of great effect, and will doubtless be imitated in future wars. A light kind of mortar, called Coehorn after its inventor, and weighing about 160 lbs., mounted upon wooden blocks furnished with handles, designed to throw 24-pound shells, is also an effective gun for use against rifle pits or light breastworks, and is again becoming popular. Early attempts were made to throw hollow projectiles from perrières and culverins; but great difficulties were experienced in loading them, and the accidents which resulted caused the practice to be abandoned for a time. Subsequently, however, the effort was renewed, and, after the length of the piece was reduced so that the projectile could be placed in position by hand, became successful. These short cannon came rapidly into use, and, under the name of howitzers (Ger. *Haubitzen*), are now found in the artillery systems of all nations.—The calibre of a cannon is the diameter of its bore, given in inches, or in the weight of the ball which it takes; but since the introduction of rifled cannon and elongated shot, the calibre of a gun is generally expressed in the measure used in giving the diameter of the bore. Each nation has its own system of calibres, and no two have the same. Changes are continually being made, and improvements are everywhere in progress. During the past 20 years many novelties have

been introduced both in the construction and the use of cannon. In 1820 the heaviest gun mounted upon our seacoast was the 24-pdr. throwing a ball 5.82 inches in diameter. At present (1878) the heaviest is a cast-iron smooth-bored 20-inch gun, throwing a shell weighing 1,080 lbs., with a charge of powder varying from 100 to 200 lbs.—Cannon are classified according to their nature, uses, and peculiarities, as guns, howitzers, and mortars, or as field, mountain, prairie, siege, and seacoast cannon; or again, as rifled and smooth-bored cannon. The principal parts and nomenclature of cannon are shown in fig. 6. The interior of cannon may be divided into three distinct parts: the vent, or channel by which fire is communicated to the charge; the chamber, or seat of the charge; and the bore, or that part of the cylinder passed over by the projectile. The size of the vent should be as small as possible in order to diminish the escape of the gas, and the erosion of the metal which results from it; and experiment shows that the interior orifice of the vent should be placed at a distance from the bottom of the chamber equal to a quarter of its diameter, or at the junction of the sides of the chamber with the curve of the bottom. The form of the chamber, or seat of the charge, has an effect upon the force of the gunpowder, as well as upon the strength of the piece to resist it; and experience has shown that its length should in general be equal to its diameter, and its surface should be as small as possible compared with its volume. The charges with which solid projectiles are fired being generally greater than one sixth of their weight, the cartridge occupies a space the length of which is greater than the diameter; the form of the seat of the charge is therefore simply the bore prolonged. This arrangement reduces the length of the charge so that its inflammation is as complete as possible before the projectile begins to move. To give additional strength to the breech, the bottom of the bore is generally rounded into an arc of a circle, but is sometimes hemispherical, tangent to the surface of the bore. All cannon of the newest models have the bottom of the bore finished as a semi-ellipsoid, this form being thought to give greater strength than the hemisphere. The following figures illustrate the

various forms of chambers in use. In the earlier days of artillery, when mealed powder was habitually used, it was believed that the longest pieces gave the greatest range. In accord-

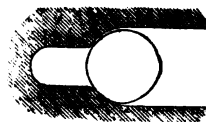


FIG. 2.—Cylindrical Chamber.

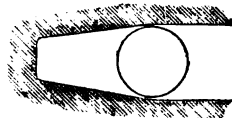


FIG. 3.—Conical Chamber.

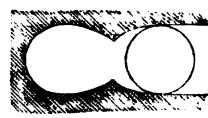


FIG. 4.—Spherical Chamber.

ance with this idea, culverins were made of great length, and were only shortened after repeated experiments showing that the range increased at each reduction in length. The length of the bore has an important effect upon the velocity and range of the ball. This will be clearly seen by a consideration of the forces which accelerate and retard its movements. The accelerating force is due to the expansive effort of the burning powder, which is greatest when the grains are completely converted into gas, which in turn depends upon the size of the charge and the size and constitution of the grains. The retarding forces are the friction of the projectile against the sides of the bore, the shocks of the projectile striking against the sides of the bore, and the resistance offered by the column of air in front of the projectile. As the accelerating force of the charge increases up to a certain point, or till the combustion is completed, and rapidly diminishes as the space in rear of the projectile increases, and as the retarding forces are always opposed to its motion, it follows that there is a point where these forces would become equal, and the projectile move with its greatest velocity; it also follows that after the projectile passes this point its velocity decreases, until it is finally brought to a state of rest, which would be the case in a cannon of great length. Experiments made by Maj. Mordecai show that the velocity increases with the length of bore up to 25 calibres, but that the gain beyond 16 calibres gave an increase of only $\frac{1}{16}$ to the effect of a 4-lb. charge. Taking the calibre as the unit of measure, it has been found by experience that the length of bore is greater for small arms which fire leaden bullets than for guns which fire iron shot, and greater again for the latter than for howitzers and mortars which fire hollow projectiles. In the earlier days of artillery, when dust instead of grained powder was used, the weight of the charge was equal to that of the projectile; but it is now admitted that a charge of powder equal to one fourth of the weight of the projectile, and a bore of 18 calibres long, are the most favorable combination that can be made in smooth-bored cannon, to obtain the greatest range with the least strain upon the piece and its carriage.—The exterior form of a cannon depends upon the strength necessary to resist the varying pressure of the gas generated by the combustion of the gunpowder, and in general terms may be described as being largest at the seat of the charge, and gradually decreasing toward the muzzle, at or near which it is smallest. Various methods have been resorted to for determining the pressure of the gases throughout the bore, and deducing therefrom the proper exterior form for the different kinds of cannon. The most successful of these is a modification of a plan first used by Col. Bomford about 1841, and subsequently improved by the late Gen. Rodman of the United States ordnance corps. It

consists in boring a series of small holes through the sides of a cannon at right angles to its axis, at intervals of one calibre, and loading them with steel balls, which are projected by the force of the charge into a ballistic pendulum. The pressure at the various points is calculated from the velocity given to the balls. By this plan the form of the guns known as columbiads was determined. Gen. Rodman's modification consists in substituting for the bullets a steel punch which is pressed by the force of the gases into a piece of soft copper. The weight necessary to make an equal indentation by the same punch in the same copper is then obtained by machinery for each hole in the side of the gun, and a curve constructed by plotting the results thus obtained, as in the following diagram. The ordinates of the curve A show the pressure on the bore at intervals of two calibres, commencing at the bottom of the bore for grain powder; and those of the curve B show the same for cake powder. The latter produced only about one half the mean pressure on the length of the bore, and gave nearly the same velocity to the projectile. Cannon, in common with all other firearms are subjected by usage to four

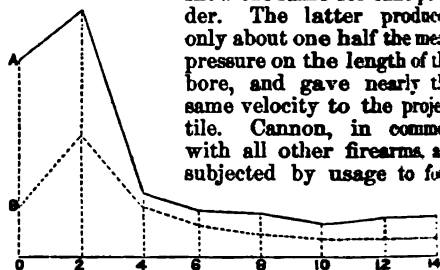


FIG. 5.—Pressure by Calibre.

classes of strains: tangential strains, which act to split the piece open longitudinally; longitudinal strains, which act to pull the piece apart in the direction of its axis; strains of compression, acting from the axis outward; and transverse strains, acting transversely, as it were, upon the staves of which the piece may be supposed to consist. A formula embodying these strains, the pressure of the gas, and all other elements entering into the question, was deduced by Gen. Rodman from a series of original experiments. Its solution for particular cases gives a series of curved lines, a specimen of which is seen in the following figure of a Rodman gun. The exterior

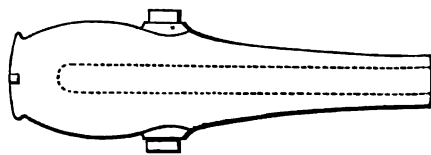


FIG. 6.—Rodman Gun.

of a cannon is divided into five principal parts: the breech, A; the first reinforce, B; the second reinforce, C; the chase, D; and the swell of the muzzle, E. The breech is the solid part of the piece in the prolongation of the axis; its length should be from one to one and a quarter

time the diameter of the bore, H. The first reinforce extends from the base ring to the seat of the ball, and is the thickest part of the piece, for the reason that the pressure of the gas is found by experience and calculation to be the greatest before the ball has moved far from its place. The second reinforce is that portion of the piece to which the trunnions are attached, and extends from the first reinforce to the chase; it is made thicker than is necessary to resist the pressure of the gas, in order to serve as a proper support for the trunnions and to compensate for defects likely to appear in all castings of irregular shapes. The chase extends from the end of the second reinforce to the muzzle, or to the swell of the muzzle, which is now generally omitted from large cannon. Trunnions, F, are cylindrical arms attached to the sides of cannon for the purpose of supporting them upon their carriages, and permitting them to be elevated and depressed in action. On the supposition that the strain upon the trunnions is proportional to the weight of the charge, it is laid down as a rule that the diameter of a gun's trunnions should be equal to the diameter of its bore, and of a howitzer's equal to the diameter of its chamber. The axis

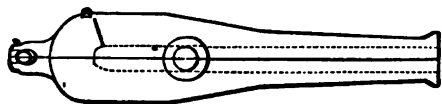


FIG. 7.—Dahlgren Gun.

of the trunnions is placed in the same plane with the axis of the piece in all the cannon of the United States service; and in this position the force of the charge is communicated to the trunnions directly, without producing any other than the inevitable strain on the carriage and without checking the recoil. Were the axis of the trunnions above or below that of the piece, the force of the discharge would act to turn the piece slightly upward or downward, producing unequal strains. In many cannon the axis of the trunnions passes also through the centre of gravity of the piece. This arrangement was introduced by Gen. Rodman, who has shown that cannon constructed in this way may be fired with accuracy, and, although easily moved, do not when fired sensibly change their position before the projectile leaves the bore.—The weight which a cannon should have depends upon the weight of the projectile it is to throw, the maximum velocity which it may be desired to give to it, and the extent of the recoil that can be permitted. The last being limited by the conditions of service, the weight of the piece may be deduced from the principle that the quantity of motion expended on the piece, carriage, and friction is equal to that expended on the projectile and the air set in motion by the charge. A "gun," technically speaking, is a heavy cannon, intended to throw solid shot with large charges of powder, for the purpose

of attaining great accuracy, range, and penetration; it is distinguished from other cannon by its great weight and length, and by the absence of a chamber. It is suitable for firing shell and solid shot. The system of Gen. Paixhans consists in the employment of shells in heavy cannon, and not in any special form of the gun itself. The howitzer, alluded to before, is a cannon employed to throw large projectiles with small charges of powder; it is shorter, lighter, and more nearly cylindrical in shape than a gun of the same calibre, and has a chamber for the reception of the charge. The principal advantage of a howitzer over a gun is that it weighs less, and can produce at short range a greater effect with hollow projectiles and case shot. A mortar is a still shorter cannon than a howitzer, and is employed to throw hollow projectiles at greater angles of elevation, so as to produce effect by the force and direction with which they descend upon their object. Columbiads are a kind of cannon

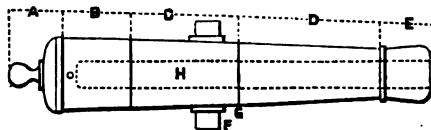


FIG. 8.—Seacoast Gun.

for seacoast purposes, which combine certain qualities of the gun, howitzer, and mortar. They are long chambered pieces, capable of projecting shells and solid shot with heavy charges of powder, at high angles of elevation, and are therefore equally suited for the defence of narrow channels and distant anchorages. They were invented by Col. Bomford, an American officer, and were first used in 1812, previous to Gen. Paixhans's adoption of the same idea. The different kinds of cannon are made of various sizes and classifications according to their use, and are adapted to seacoast defence, siege, and garrison purposes. Field cannon are used in the operations of armies in the field, and are divided into light and heavy pieces; the former following the rapid movements of infantry and cavalry, and the latter designed to commence action at long distances, and to defend fortifications and other important positions on the field of battle. Formerly light field pieces were 6-pdr. guns and 12-pdr. howitzers; and the heavy pieces were the 12-pdr. gun and 24 and 32-pdr. howitzers. But at the outbreak of the late war in this country, the heavy pieces were discarded, or used for arming field works and blockhouses, and their places were supplied by the light 12-pdr. smooth-bore guns and the 3-inch rifled guns. These rifle guns are made of wrought iron, by wrapping boiler plate around a mandril so as to form a cylindrical mass, which is firmly and solidly welded by bringing it to a white heat and passing it between rollers. The trunnions

are afterward welded on, and the piece bored and turned to the proper shape. The 8-pdr. Parrott rifle gun, which is also employed in the

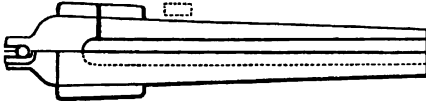


FIG. 9.—Parrott Rifle Gun.

United States, is a cast-iron piece, reinforced by a band of wrought iron shrunk upon the first reinforcement. Before the general introduction of rifle guns the Napoleon gun, taking its name from the late emperor of the French, was adopted by nearly all nations. It was designed to take the place of both light and heavy pieces, and thus simplify field artillery. Its exterior is characterized by the absence of mouldings and ornament; it has no chamber, and its weight is 1,200 lbs., or 100 times the weight of the projectile. Mountain and prairie cannon are designed for use in regions destitute of roads, and must therefore be made sufficiently light to be carried on pack animals. They are not very effective, and are only used when nothing heavier can be brought up in time.—Rifle cannon are of various sizes and patterns, and are constructed with spiral grooves, or rifles, cut into the surfaces of the bore; the purpose of which is to communicate a rotary motion to oblong projectiles, without which they would turn over during their flight, and present a varying surface to the air. This rotary motion, if effectively communicated to the projectile, keeps its point constantly in the direction of its flight, and gives it increased range and steadiness, and also increased accuracy. Great attention has been given to the method of rifling cannons with the object of securing the surest and safest means of causing the projectile to follow the grooves, as it passes along the bore of the piece, under the action of the powder. A great variety of methods have been devised, but they may be classed under the following heads: by means of flanges upon the projectile, or by giving it a peculiar shape by causing some part of it to expand, or by causing some part to be compressed. Solid flanges projecting from the projectile, and so shaped as to fit the rifling of the bore, were the first means used; but as these projections were of the same hard and unyielding substance as the body of the projectile, they frequently led to the bursting of the piece. Buttons of zinc, copper, or bronze were afterward adopted by nearly all European powers. Whitworth and Lancaster adopted the idea of making cannon with the bore cut in a spiral form, having a polygon or curve for its base, and giving the projectile a corresponding shape. This method secures the rifle motion with much certainty, and permits the use of bolt-like projectiles of great strength, but which bring heavy strains upon the cannon, accompanied by a correspond-

ing tendency to deterioration of the piece. Projectiles which take the rifles by expansion are composed of cast iron, with a cup, band, or other arrangement of soft metal at the base, which is expanded and forced into the grooves by the explosion of the charge. Projectiles of this class are generally used in the United States service, because they are easily forced to the bottom of the bore, and do not clog the grooves or overstrain the piece. There are many varieties of this class, the most noted of which were invented by Parrott, Hotchkiss, Schenkle, and Dyer. Expanding projectiles cannot be fired with such heavy charges as some others, for fear of breaking, nor are they so sure to receive the rifle motion. Projectiles which take the rifles by compression are principally used in breech-loading cannon. They are generally covered with soft metal, so as to be slightly larger than the bore of the piece, but still not too large to enter the chamber easily. The explosion of the charge sets the projectile in motion, compressing the soft metal into the grooves, and compelling the projectile to follow the direction of the rifling. The form of a rifle groove is determined by the angle which a tangent to any point of it makes with the corresponding element of the bore. If the angles be equal at all points, the groove is said to be uniform; if they increase from the breech to the muzzle, the grooves are called increasing; and if the reverse, decreasing. Grooves are cut by moving a rod armed with a cutter backward and forward in the bore, and giving it a rotary motion at the same time. The width of a groove depends upon the diameter of the bore and the peculiar form of projectile to be used. Rifled cannon for flanged projectiles generally have four grooves, while those for expanding projectiles generally have an odd number, from five upward.—The processes used in manufacturing cast-iron or bronze cannon are moulding, casting, cooling, and finishing. Moulding consists in forming a cavity of the proper shape in moulding sand, by using wooden or cast-iron patterns, slightly larger than the finished piece is to be. The pattern is divided into several pieces; the first consists of the body of the piece, from the base ring to the chase ring; the second, of the swell of the muzzle and the sprue or dead head; the third, of the breech; the fourth and fifth, of the trunnions. The sprue, or head, is an additional length given to the piece for the purpose of receiving the scoria of the metal as it rises to the surface, and furnishing the extra metal to provide for shrinkage, and extra weight to increase the density of the lower portions of the piece. The best material for the mould is dry, hard, refractory sand, which must be moistened with clay water to make it adhesive. The mould is formed in a casing of cast iron, called a box or flask. The pattern for the sprue and muzzle, previously coated with pulverized charcoal or coke, moistened with clay water to prevent adhesion, is placed upon the ground.

the muzzle part up, carefully surrounded by the corresponding part of the jacket, and when properly adjusted the sand is rammed about it. The model for the body of the piece is then placed on top of this, and the corresponding parts of the jacket adjusted and filled as before. The patterns for the trunnions, rimbases, and cascable are affixed and filled in a similar manner, and the mould completed. Care is taken to cover each portion of the model with coke wash, and to sprinkle dry sand upon the top of each section of the mould, to prevent adhesion when they are separated. In the body of the sand within the flask a channel is formed, in the same manner as the cavity of the mould, for the purpose of permitting the molten metal to be introduced at the bottom of the mould, so as to prevent its injury by falling metal. If any portion of the mould is injured by withdrawing the pattern, it is repaired, and the interior of the mould then covered with coke wash, after which the several parts are placed in an oven and gradually dried. When this is finished, the parts are carried to a pit, reunited, and secured in a vertical position, breech downward. Pains are then taken to see that all parts of the mould are perfect and properly adjusted; the melted metal is permitted to flow in at the bottom of the channel made for that purpose, and as it rises in the mould a workman agitates it with a long wooden pole, taking care that the scoria and other impurities are prevented from getting into the cavities for the trunnions. After the mould is filled, it is permitted to stand from three to twenty days imbedded in sand, so as to cool gradually. When nearly cold the gun is hoisted from the pit, taken out of the flask, and cleaned of the sand. All solid bodies contract in cooling. If they cool unequally they will also contract unequally, and thus undergo a change of form, unless restrained by the presence of a superior force. The general form of a gun casting is that of a solid frustum of a cone; and in cooling from the exterior, the thin outer layer contracts first, and forces the hotter and more yielding metal within toward the centre of the mould. The next layer cools, and tends to contract; but the exterior to which it coheres has become nearly rigid, and does not fully yield to the contraction of the inner layer. The result is that the cohesion of the particles of the inner layer is diminished by a force of extension, while that of the outer layer is increased by a force of compression. As the cooling continues, this operation is repeated till the whole mass is brought to a uniform temperature. All cannon, therefore, that are cooled from the exterior, are subjected to two straining forces: the outer portions to a strain of compression, and the inner portions to a strain of extension; and these forces exert themselves upon the different parts of the gun with intensities proportional to their distance from the neutral axis, which is composed of particles so situated as to be neither extended

nor compressed by the cooling process. The effect of these strains may be so great as to crack the interior metal of cast-iron cannon while they are cooling. These considerations led Capt. (afterward Gen.) Rodman to invent the plan, now generally adopted, of cooling cannon from the interior, by passing a stream of water through a hollow core inserted in the centre of the mould cavity before casting, and surrounding the flask with a mass of burning coals to prevent the radiation of heat from the exterior. By the use of Rodman's method cast-iron guns of 20-inch calibre have been made, and found by experiment to withstand the vicissitudes of usage admirably. After the piece is cooled, it is fastened upon a rack and lathe, and the sprue head cut off. If cast solid, the boring is commenced by means of a piercer, which bores a small hole along the axis to the bottom of the chamber; this is followed by a second cutter called a reamer, which completes the bore to the chamber. The reamer is then removed, and its place supplied by the chamber cutter, which gives the proper form to that part of the bore. In pieces cast hollow, the piercer is not used. While the boring is taking place the outside of the piece is turned to the proper shape, except at the trunnions, which are turned down by another machine. The vent is bored while the gun is in the trunnion lathe. The time required to finish a cannon depends upon its size; a 10-inch columbiad requires six weeks, while a 20-inch Rodman requires from 12 to 18 weeks. —The manufacture of wrought-iron or steel cannon is much more complex and attended by much greater difficulties than that of cast-iron or bronze. This is due to the fact that no machinery has yet been devised for heating, handling, and forging masses of wrought iron or steel sufficiently large to construct the largest cannon without welding; and this, even when most skilfully done, is always more or less imperfect, and renders the piece liable to explosion. The term "built up" is frequently applied to all kinds of wrought cannon, in which the parts are formed separately and then united together. The object of this mode of manufacture is to secure guns of materials more elastic and durable than cast iron or bronze, or to correct the defects of one material by combining it with another of opposite quality. Among the earliest applications of this idea was the trial made to increase the hardness and therefore the endurance of bronze cannon by casting them around a core of steel which formed the surface of the bore. But built-up cannon are not necessarily composed of more than one kind of metal; some of the most noted are made of steel or wrought iron alone. In these cases the defects which usually accompany the working of large masses, such as crystalline structure, cracks, and false welds, are partially avoided by forming them in small masses, as rings and tubes of good quality and excellent workman-

ship, and then uniting them successively, either by welding, forcing, or shrinking one part over another, and in some instances by screwing them together. The various plans of making built-up guns will be best illustrated by describing some of the most noted. Armstrong guns are of two kinds, breech-



FIG. 10.—Breech-loading Armstrong Gun.

loaders and muzzle-loaders. The former are made by welding together several wrought-iron tubes at their ends; each tube is from two to three feet long, and is formed by wrapping a square bar of iron around a mandrel and welding the edges together. The part in rear of the trunnions is strengthened by enveloping it with two additional thicknesses or tubes, the outer one of which is like the inner one, but the intermediate one is formed by bending an iron slab into the proper shape and welding its edges. The details of the breech and other parts are shown in fig. 10. The muzzle-loading Armstrong gun (fig.

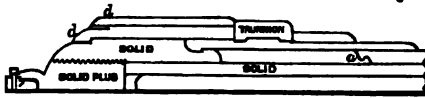


FIG. 11.—Muzzle-loading Armstrong Gun.

11) is constructed as follows: The barrel is made of solid steel tempered in oil, by which its brittleness is decreased and tenacity increased; that part of the barrel at and in rear of the trunnions is enveloped by three layers of wrought-iron tubes, not welded together at the ends, but hooked to each other by shoulders and recesses. This operation is accomplished by expanding the end of a tube by heat and slipping it over the shoulder of another, upon which it contracts by cooling. The Armstrong gun is not liable to burst without previously showing considerable enlargement. It is stated that of 8,000 guns built on this system, not one has failed by explosion. They have been made as large as 18½-inch calibre, weighing over 50,000 lbs. The Whitworth guns are made of a substance called homogeneous iron, or a species of low steel said to

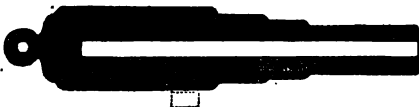


FIG. 12.—Whitworth Gun.

be made by melting short bars of Swedish iron and adding a small quantity of carbonaceous matter, after which it is cast into ingots.

The smaller Whitworth guns are forged solid; the larger ones are built up with shells or hoops, forced into each other by hydraulic pressure. For this purpose they are made with a slight taper. The ends of the hoops are joined by screw threads. The hoops are first cast hollow and then hammered out over a steel mandrel or rolled out in a machine like that used for forming wheel tires. These guns have been made of various sizes up to 7-inch calibre. The Blakely gun is made as follows: The in-

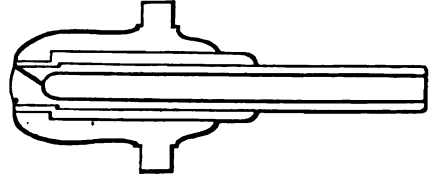


FIG. 13.—Blakely Gun.

ner tube or barrel is formed of low steel; the next tube consists of high steel, and is shrunk on the barrel with just sufficient tension to compensate for the difference of elasticity between the two. The outer jacket to which the trunnions are attached is of cast iron, and is put on with only the shrinkage attained by warming it over the fire. The steel tubes are cast hollow and hammered over steel mandrels by steam hammers, by which process they are elongated about 130 per cent., and the tenacity of the metal at the same time increased. They are made to throw 700-lb. projectiles, with a calibre of 12 inches, and weigh as much as 40,000 lbs. (See fig. 18.) Palliser and Parson guns are made by boring out cast-iron guns

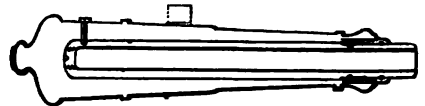


FIG. 14.—Palliser Gun.

of old patterns and inserting a new barrel of coiled wrought iron. (See fig. 14.) Krupp guns are made at Krupp's works at Essen, Prussia, of solid low cast steel, and have achieved a great celebrity, partly through their enormous size and partly through their great durability. The steel is formed in crucibles in the usual way, and is then cast into a large ingot constituting the mass of the gun. This ingot is wrought under powerful steam hammers to give the requisite texture to the metal and proper form to the gun. In this way it is said that 20-inch muzzle-loading rifle cannon have been made, weighing over 120,000 lbs. The details of this manufacture are kept secret, but its success is probably due to the very heavy machinery employed, the skilful heating of the large masses to the centre without burning the outside, the presence of manganese in the

iron from which the steel is made, and the great care with which all the operations are conducted. The Gatling gun is a machine gun composed of six barrels made to revolve around a central axis parallel to their bore by means of a hand crank. As each barrel comes opposite to a certain point a self-loaded metal-cased cartridge falling from a hopper is pushed into the breech by a plunger, and held there till it is exploded by a firing pin. This gun is capable of firing 200 shots per minute, with great range and precision. The mitrailleuse of the French is essentially the same machine. (See ARTILLERY.)

CANNON, a central county of Tennessee, drained by Stone's river and the Caney fork of Cumberland river; area, 220 sq. m.; pop. in 1870, 10,502, of whom 927 were colored. The surface is uneven and the soil generally fertile. The chief productions in 1870 were 79,520 bushels of wheat, 564,330 of Indian corn, 26,870 of oats, 105,055 lbs. of butter, 21,451 of wool, 80,750 of tobacco, 54 bales of cotton, and 160 hhds. of sugar. There were 3,360 horses, 1,202 mules and asses, 2,487 milch cows, 4,068 other cattle, 12,198 sheep, and 23,550 swine. Capital, Woodbury.

CANNONSBURG, a post borough of Washington co., Penn., 18 m. S. W. of Pittsburgh; pop. in 1870, 641. It is the seat of Washington and Jefferson college, a Presbyterian institution, which in 1871 had 10 instructors, 118 students, of whom 39 were in the preparatory department, and a library of 17,000 volumes.

CANO, Alonso, surnamed EL RACIONERO, a Spanish painter, sculptor, and architect, born in Granada, March 19, 1601, died there, Oct. 5, 1665. He became so distinguished in each of these arts that his countrymen called him the Michel Angelo of Spain. His "Conception of the Virgin," in the church of San Diego at Granada, is considered his masterpiece. His works in sculpture and architecture are numerous. He was a contemporary of Velasquez, and in 1638 was appointed court painter to Philip IV. His ungovernable temper on various occasions brought him in collision with the authorities, and he was once put to the rack on suspicion of having killed his wife in a fit of jealousy, but was subsequently absolved from the charge. On this occasion his right arm was exempted from torture, as being *excellens in arte*. It is related that on his death-bed he refused to take the crucifix from the priest on account of its bad workmanship.

CANO, Jacobo. See CAM, Diogo.

CANO, Juan Sebastian del, a Spanish navigator, born at Guetaria, died at sea, Aug. 4, 1526. He early became captain of a vessel sailing to the Levant and Africa, and subsequently joined Magalhaens's famous expedition in charge of one of its five vessels. Soon after the violent death of Magalhaens (April 27, 1521), he succeeded Carabello as commander, and returned to Spain in 1522 by the Cape of Good Hope with only one vessel left of the original five, after having visited the Moluccas or Spice is-

lands and established friendly relations with one of the native sovereigns. He received a pension from Charles V., and was second in command of a new expedition of five vessels under Loaisa, which sailed on July 25, 1525, and met with many disasters. They passed the strait of Magellan May 26, 1526, but being again overtaken by storms in the Pacific, Loaisa died July 30, and Cano Aug. 4.

CANON (Gr. *kanon*, a straight rod, hence a measuring rod or rule). Collections of the old Greek authors, as furnishing the rule or standard of excellence, were called *kanones*, models or classics. The Greek word is used in the New Testament (Gal. vi. 16, Phil. iii. 16, received text) and in the fathers to denote a rule or standard. In 2 Cor. x. 18, 15, 16, it is translated "rule" or "line," and denotes a limited part or district, as if measured off or assigned by rule. The "canonized books" or "canonical Scriptures," i. e., those admitted by the rule or furnishing the rule, were spoken of before Jerome, Augustine, and others applied the word canon directly to the books of Scripture which are received as genuine and authoritative. Jerome styled these "the holy library," and we call them "the holy Bible," or simply "the Bible." (See BIBLE.) From the lack of contemporary documents much obscurity rests upon the history of the formation of the Old Testament canon. As the particular books were avowedly written at different times during a period of more than 1,000 years, each has its own history and evidence of divine authority; but a very steadfast tradition of the Jews ascribes to Ezra and "the great synagogue" the work of collecting and promulgating the Old Testament Scriptures. This tradition in its general features harmonizes with the contents of the books and the known history of Judaism. The tradition appears, with various embellishments of detail, in the 2d (or 4th) book of Esdras (xiv. 21-48), in Tertullian, Clement of Alexandria, Irenæus, and other early fathers, and in several books of the Talmud. The mention, in 2 Macc. ii. 13, of Nehemiah's gathering together in a library "the acts of the kings, and the prophets, and of David, and the epistles of the kings concerning the holy gifts," is consistent with the idea of a gradual collection and promulgation of the sacred writings, as they then existed, during the time of Ezra and Nehemiah. All subsequent references to the Scriptures mention or presuppose the existence of the completed canon of the Old Testament. The Hebrew canon of 22 or 24 books contained all those which are now reckoned as 39. The threefold division of the Hebrew Scriptures into the law, the prophets, and the hagiographa or sacred writings (see BIBLE), is recognized in the prologue to Ecclesiasticus, in Philo, Josephus, the New Testament (Luke xxiv. 44), the Talmud, &c. Philo quotes from or refers to most of the books of the Old Testament. Josephus, who says they are "justly

believed to be divine," and quotes or uses all but Proverbs, Ecclesiastes, and Canticles, declares that "during so many ages as have already passed, no one hath been so bold as either to add anything to them, to take anything from them, or to make any change in them." Christ and his apostles ascribe divine authority to the Old Testament Scriptures, and the New Testament quotes all but six or seven of the 39 books of the Old Testament. The Septuagint or Alexandrine version of the Old Testament contains indeed most of what is known to us as the Apocrypha, including Esdras, Tobit, Judith, nearly seven chapters of Esther, Wisdom of Solomon, Ecclesiasticus, Baruch, Song of the Three Children, Susannah, Bel and the Dragon, and 1, 2, and 8 Maccabees. These compositions were not, however, embraced in the Hebrew canon; were not considered by Philo, Josephus, and other Greek-speaking Jews, who used this version, as of equal authority with the law, prophets, and hagiographa; and were not quoted in the New Testament as authoritative. Those early Christians who were unacquainted with Hebrew, and used only the Greek version, sometimes quoted and mentioned the apocryphal books as canonical; but when the subject became one of serious study, scholars generally accepted the judgment of the Jews. The most ancient Christian list, the Greek one of Melito, bishop of Sardis (about A. D. 177), mentions as the books of the Old Testament all but Nehemiah, Esther, and Lamentations, the first and probably the second of these being included under Ezra, and the third under Jeremiah, while he omits all the Apocrypha. With this catalogue agreed that of Gregory Nazianzen. That generally referred to Amphilochius names the same books, and says, "Besides these some admit Esther." Origen's list includes Esther and Lamentations with the other books, and (according to the present Greek text) the apocryphal Baruch. With him agree Cyril of Jerusalem and the council of Laodicea, about 368, though the canon of this council lacks authenticity. Epiphanius mentions Esther as well as "the 22 books" of the Old Testament. Athanasius puts Esther in the second rank, and retains Baruch. The apostolical canon, of uncertain date, admits three books of Maccabees, one of Judith (in some MSS.), and Esther, and recommends instruction in Ecclesiasticus. The catalogues of the Latin church exclude no books reckoned as canonical by the Hebrews; but the canon of Augustine embraces the books of Tobit, Judith, Wisdom of Solomon, Ecclesiasticus, 1 and 2 Maccabees; and the council of Hippo (393), with the third and fourth councils of Carthage (397 and 419), adopted the same enumeration. Jerome, however, followed by a continued succession of the more learned fathers in the western church, adhered strictly to the Hebrew canon, and rejected these "ecclesiastical" or "deuterocanonical" books. "The

church," said Jerome, "may read these for the edification of the people, but not to establish the authority of the doctrines of the church." But the Roman Catholic church, following the old Latin and Septuagint versions, and the canon of Augustine, accepted as canonical by a decree of the council of Trent (April 8, 1546), all the "ecclesiastical" books, embracing all the Apocrypha of the English Bible, except 1 and 2 Esdras and the Prayer of Manasse. The Protestant churches, on the other hand, unanimously agree with Jerome in adopting the Hebrew canon of the Old Testament, and refusing to allow any dogmatic authority to the Apocrypha.—The canon of the New Testament was formed upon substantially the same principles as that of the Old. A late and improbable tradition ascribes to the apostle John the work of collecting and sanctioning the writings worthy of being regarded as sacred; but it is now generally agreed among those who receive the Scriptures as authoritative, that the original churches, especially the larger and abler ones, collected, each for itself, a complete set of the writings that it found to be properly authenticated as the productions of apostles and other inspired men, the general accordance with one another of these numerous collections thus proving the correctness of our present New Testament canon. That John had before him copies of the other three gospels is highly probable, his gospel being supplementary to them. That the epistles of Paul or most of them, were early collected together, is naturally inferred from 2 Peter iii. 16, which speaks of "all his epistles," and places them on an equality with "the other Scriptures." The apostles expected their writings to be publicly read and received as of divine authority. Clement of Rome, Ignatius, Polycarp, and others called "apostolic fathers" because contemporary with apostles, quote reverentially the gospels and all the epistles, except Jude, 2 Peter, and 3 John, though the quotations from 1 and 2 Thessalonians, Colossians, Titus, and Philemon are not decisive. The epistle to Diognetus, regarded as one of the earliest of uninspired Christian writings, mentions the law, the prophets, the gospels, and the apostles. Marcion's canon embraced ten Pauline epistles and a gospel mutilated from Luke's, rejecting the rest on doctrinal grounds. Theophilus often calls the New Testament writings the "holy Scriptures" or "the divine Word," and mentions the law, the prophets, and the gospels as alike divinely inspired. Tertullian speaks of "each Testament," and distinguishes the "New Testament," made up of the "Gospels" and "Apostles," from the "Old Scripture." Irenæus also calls the New Testament writings "the holy Scriptures," or the "oracles of God," argues that there must be four gospels, and puts the evangelical and apostolic writings on an equality with the law and the prophets. The Muratorian canon (about 190), mutilated at the beginning and end, recognizes

the gospels of Mark, Luke, and John, 13 epistles of Paul, 3 of John, Jude, the apocalypses of John and Peter (the latter declared not to be read in the churches by some), and omits James, Hebrews, and 2 Peter. Clement of Alexandria combines the "Apostle" (or "Apostles") and the "Gospel" as "Scriptures of the Lord" with "the law and the prophets," ratified by the authority of one almighty power. It is admitted that a Syriac version of the New Testament existed about the close of the 2d century; and there is no reason to doubt that the Peshito-Syriac version has now the same books. This lacks 2 and 3 John, 2 Peter, Jude, and the Apocalypse, but has all the rest of the New Testament. At the beginning of the 3d century, therefore, the four gospels, Acts, 13 epistles of Paul, and 1 John were universally received by the churches; 1 Peter was undisputed, though the meaning of the Muratorian canon is obscure; Revelation was generally received, though it was not in the Syriac version, and Dionysius of Alexandria (a disciple of Origen) with others afterward ascribed it to an unknown "John the presbyter;" the epistle to the Hebrews was generally received in the Greek and Syrian churches, its Pauline origin being disputed in the latter; James was received by the Syrian churches; Jude by the western; 2 and probably 3 John by the Greek and western; 2 Peter is not clearly mentioned in any extant writing of this date. Origen calls the collected gospels, Acts, and apostolical epistles "the New Testament," quotes as authoritative Hebrews and Revelation, mentions 1 John as of more undoubted authority than 2 and 3 John, appears fluctuating in regard to James and Jude, and names 2 Peter as doubtful. Eusebius, the historian, in the early part of the 4th century, prepared a catalogue of the New Testament Scriptures, based upon careful investigation. In his classification the gospels, Acts, 13 (or 14) epistles of Paul, 1 John and 1 Peter, and the Apocalypse (if authentic) are ranked as genuine and universally acknowledged. Among disputed books he mentions the epistles of James and Jude, 2 Peter, 2 and 3 John, the epistle to the Hebrews (which he elsewhere quotes as authoritative), and the Apocalypse (if not by the apostle John). He reckons as "spurious" the Epistle of Barnabas, the Shepherd of Hermas, the Revelation of Peter, the Acts of Paul, &c. He reckons as "utterly spurious" the Gospels of Peter, Thomas, and Matthias, the Acts of Andrew, Peter, and other apostles, &c. The canon of the council of Laodicea, which, though unauthentic, belongs to this period, and the catalogues of Cyril of Jerusalem and of Gregory Nazianzen, accept all the books of our present collection except the Apocalypse. Before this, the Apocalypse had been expressly quoted as authoritative by Justin Martyr, Irenæus, Clement of Alexandria, Tertullian, Origen, Hippolytus, Methodius, and others. Athana-

sus and Epiphanius also include the Apocalypse with the catholic epistles and Hebrews as canonical. The recently discovered Sinaitic MS., which is assigned to the 4th century, contains all the New Testament of our present canon, with the Epistle of Barnabas and the Shepherd of Hermas.—Small sections among the Protestants have dissented from the canon as accepted by the principal churches. The Socinians in the 16th century, adopting methods of investigation severely critical, have thrown doubts upon several writings whose genuineness had been left unquestioned for centuries. The same process has been continued to the present day by theologians of different schools, especially in Germany. The Swedenborgians, discarding critical methods entirely, and receiving no dogmatical writing as inspired or canonical, set summarily aside the decrees of councils and the verdicts of scholars, and hold that the four gospels and the Apocalypse are the only Scriptures of the New Testament written under the full influence of the Holy Spirit. They also deny inspiration to the purely narrative and dogmatic writings of the Old Testament, Chronicles, Ezra, Nehemiah, Esther, and the books of Solomon; finding a broad line of distinction between these and the others in their doctrine of the internal sense.

CANON, an ecclesiastical dignitary who possesses a prebend, or revenue allotted for the performance of divine service in a cathedral or collegiate church. Canons were originally priests who lived in community, appointed to assist the bishop in his duties, and supported by the revenues of the bishopric.—Secular canons are those who, in progress of time, have left off the custom prevalent in monasteries of living a community life, and have the privilege of enjoying the returns of their respective benefices. In the church of England, by the act of 1840, all members of cathedrals except the dean are canons, and receive their appointments by letters patent from the crown. The obligations of the canons are contained under the three following heads: 1, the duty of residing in the place where the church they belong to is situated; 2, assisting at the canonical offices which are celebrated in the church; and 3, attending the meeting of the chapter at the appointed times. They cannot be absent from their benefices for a longer period than three months, and the minor canons, of whom there are from two to six in a cathedral, perform the choral service. In their collective capacity they are called a chapter, and form the council of the bishop. In each chapter there are dignitaries. The name was originally applied to all the clergy, but was afterward confined to those who were connected with the cathedral church, or to specially privileged churches.

CANON, in music, a species of vocal composition in several parts, in the form of a perpetual fugue, in which the voices begin at intervals, one after the other, so that each voice sings

the strain of the preceding one, and all sing different portions of the melody at the same time. It differs from the fugue in requiring that the subject be repeated by each part.

CAÑON, a Spanish word, signifying a tube, flue, or pipe, now in common use in the United States to designate deep ravines worn by running water. The most remarkable of these cañons, which are very numerous in the interior of North America, is the great cañon of the Colorado, whose walls rise perpendicularly in some places 7,000 ft. above the river. In the interior of New York, near the head waters of Seneca lake, there are several remarkable cañons worn by small streams, of which the most noted is at Watkins, known as the Glen.

CANONICA, *Luigi della*, an Italian architect, born in Milan in 1742, died there in February, 1844. Among his principal works are the palazzo Bellotti and his own sumptuous residence, the casa Canonica, at Milan, several theatres in that city, Brescia, and Mantua, and one at Parma, which was built after his design by Bettoli. His most celebrated work is the amphitheatre della Porta Vercellina at Milan, begun in 1805 by order of Napoleon. His labors brought him not only fame, but wealth to the amount of \$700,000, of which he bequeathed \$17,000 to the academy of Milan, the interest to be used for the education of poor artists, and \$35,000 to the primary schools of Lombardy.

CANONICAL HOURS, originally the different portions of the breviary or divine office in the Roman Catholic and Greek churches, arranged for use at certain hours of the day, but not now strictly adhered to. According to the original custom, still preserved in some strict monastic orders, matins and lauds should be recited soon after midnight, prime early in the morning, tierce, sext, and none at 9, 12, and 3, vespers late in the afternoon, and compline in the evening. The usual custom is, however, both in the public singing or recitation of the office in choir, and in the private reading of it, to say matins and lauds on the preceding evening, the little hours at some convenient time in the morning, and vespers and compline at any time in the afternoon. The office is obligatory on clergymen in the major orders, the members of monastic communities, and those who hold benefices. It is chiefly composed of the psalter, and lessons from the Scriptures and the acts of the saints and martyrs, with hymns, versicles, and prayers interspersed. A great diversity of offices have been and are in use; the one generally used in the Catholic church of the West is the Roman breviary.—In the church of England canonical hours are from 8 to 12 o'clock in the morning, and during these hours only can legal marriages be performed in parish churches.

CANONICUS, an Indian chief of the Narragansett tribe, born about 1565, died June 4, 1647. He was the firm friend of the English, and especially of Roger Williams, whom, to use the words of the latter, he loved "as his

own son to his last gasp." From him Williams obtained, March 24, 1638, the grant of land for his settlement of the future state of Rhode Island. During his life the Narragansetts were engaged in several Indian wars, but remained at peace with the white men. Many years after his death, however, under the famous King Philip, they became involved in a war with the English, which resulted in their extermination.

CANONIZATION, the ceremony by which a deceased person, who has previously been beatified (see **BEATIFICATION**), is proclaimed a saint in the Roman and Greek churches. In the Roman church this is done by the pope, who, after investigation, declares the person in question to have led a perfect life, that God has worked miracles at his intercession, either during his life or after his death, and that consequently he is worthy to be honored as a saint. In the Greek church canonization is performed by the patriarch and the bishops assembled in synod, and requires the testimony of a thousand witnesses to the virtues of the deceased. The trouble and expense of this process are so great that few saints are canonized in the Greek church. Before a beatified person can be canonized in the Roman church four consistories must be held. In the first the pope causes the petition of the parties requesting the canonization to be examined by cardinals appointed for the purpose; in the second the cardinals report the result of their investigation; in the third, which is public, a person called the devil's advocate (*advocatus diaboli*) says all he can against the proposed saints, to which another advocate responds by praising him, and reciting the miracles he has performed; in the fourth and last consistory, at which all the cardinals are convened, the canonization is put to the vote, and if the verdict is favorable the person is pronounced a saint. The first canonization is said to have been performed by Leo III. in 804. No person can be canonized until 50 years after death, except in cases of martyrdom.

CANON LAW, the public and general code of laws of the Catholic church. This church claims to be a perfect visible society, containing within herself all that is necessary for a complete and independent organization. Hence she has her own rulers, rights, and laws. Some of these laws, given by Christ himself or by the apostles in his name, are held to be immutable; others have been promulgated by the ordinary ecclesiastical authority, and can be modified or abrogated by the power whence they derive their force. The discipline or practice of the church is therefore partly unchangeable and partly changeable. The changeable discipline, deriving its origin from the ordinary ecclesiastical power, has been different in various times and places. Hence, besides the general law of the church, there are in every particular country peculiar and local rights, customs, and practices, which form what

is called the code of particular or national churches. These, however, are subject to the supreme authority, which can at any time annul them, should such a course be judged expedient or necessary. Thus, besides the general law of the church, Roman Catholics in the United States are regulated by the decrees of the councils of Baltimore and of the provincial councils held in the different provinces which have been approved of by the competent authority. There is also another source of difference in ecclesiastical polity. From the very beginning the eastern and western churches, although agreeing in the same faith and in the observance of the same moral law, and looking upon each other as integral portions of the same church, have yet observed on many points a totally different ecclesiastical discipline. This state of things continues to the present day, and the oriental churches in communion with Rome retain their own liturgy and their peculiar observances. Hence, the canon law of the Latin or western church is different in many points from that of the Greek or eastern.—The divisions of ecclesiastical law can be marked as follows: 1. The general law of the church, binding all her subjects of all nations and countries. 2. Laws peculiar either to the oriental or Latin church. 3. Laws that are observed by only one particular or national church, belonging to either of these two divisions. 4. Diocesan regulations, which have no force out of the bishopric for which they are made.—Canon law comprises the general laws for either of the two churches, eastern or western. Thus there is the canon law of the oriental and of the Latin church. To the knowledge of this the canonist must unite an acquaintance with the particular laws and customs of his own nation or province, as well as with the statutes of the diocese to which he belongs, in order to be able to apply his general rules and principles to the practical cases which may fall under his cognizance. The authority whence ecclesiastical laws derive their force is held by Catholics to be vested primarily and principally in the pope as the vicar of Christ. General councils also possess the same authority. These are composed of all or of the greater number of the bishops of the church. The decrees of a legitimate general council, that is, one presided over by the pope either personally or through his representative, when ratified by the same authority, are binding over the whole church. Patriarchs and provincial councils legislate merely for the portion of the church under their jurisdiction, their legislation being subject to the approbation or rejection of the pope. Bishops have the right to make laws or statutes for their own dioceses; these are sometimes promulgated in diocesan synods, which are composed of the principal priests of the diocese.—As the discipline of the church has not always been the same, but has been and is different in different times and places, so, too, canon law

has not always been uniform. Many regulations which once were of force have been subsequently modified or totally abrogated. Hence the chief difficulty in the study of canon law is to discern between that which is in force and that which has gone into disuse. The laws of the church have been for the most part embodied in collections. These have naturally been modified as the laws themselves have suffered changes. The history of canon law is a narrative of these different modifications. For some time after the death of the apostles, there was in all probability no written collection of laws. The faithful who lived during this period had vividly impressed on their minds the decrees and teachings of those who had conversed with the Lord. But in the course of time unruly and rebellious spirits began to manifest themselves, and discipline suffered many serious violations. As crimes occurred, decrees were enacted either to punish the transgression or prevent its recurrence in the future. These decrees generally originated in the locality in which the crime had been committed, and by degrees, through the force of similar circumstances, were adopted throughout the whole church. Thus, in the course of two centuries, many new regulations had been gradually introduced, and the primitive discipline had been more or less modified. This introduced the necessity of making a collection of these new laws, so that all might know their exact import, and thus uniformity, at least on the leading points of discipline, might be secured. Hence the first collection we meet with is commonly supposed to have been promulgated either toward the end of the 2d or the beginning of the 3d century. It is called that of the *Canones Apostolici*, or "Apostolical Canons." This name was given because these laws were represented as having been promulgated by the apostles. This, however, is not true of them, at least as they appear in this collection; for they bear the evidences of a development of organization not yet existing in the apostolic times. Most probably the rules given by the apostles for the guidance of the faithful began to be committed to writing during the 2d century. By degrees new regulations were added to them, and the collection thus gradually assumed its present form, retaining the name to which, in a certain sense, it was originally entitled. Whatever may have been its origin, it represents faithfully the discipline of the eastern church toward the latter part of the 2d and commencement of the 3d century. All, however, did not agree as to the number of the canons; the Roman church recognized only the 50 which had been translated into Latin by Dionysius Exiguus; the eastern church, after the council in *Trullo*, in the 6th century, received 85. The work called *Constitutiones Apostolicae*, or "Apostolical Constitutions," is intimately connected with the collection of canons. It is proved by Beveridge that it ap-

peared toward the end of the 3d century. It does not throw any new light on the discipline of that period, as it agrees on all points with the canons. The next collection that we meet with in the East is that which was produced in the council of Chalcedon, in the 5th century, called the *Codex Canonum*. It seems to have contained originally canons enacted in the general council of Nice, and in those of Ancyra, Neo-Cæsarea, and Gangra. These three councils, although not œcumenical or general ones, had obtained great authority throughout the whole eastern church, and their enactments were universally adopted. In course of time the *Codex* was enlarged by the addition of the canons of a council held at Antioch, and of those of the council of Chalcedon itself, and lastly of those adopted in the next general council held at Constantinople. These were the principal collections of canon law in the early centuries.—In the West there seems to have been no collection of this sort made before the council of Nice. Custom, the decrees of the bishops of Rome, which were issued as occasion required, and those of particular synods, were the basis of ecclesiastical legislation during the first three centuries. The canons promulgated at Nice were translated into Latin immediately after the celebration of the council, and were observed in the western church, together with those enacted a short time afterward at Sardica. After some time two Latin translations appeared of the *Codex* which was used at Chalcedon; one was called *Isidoriana*, or of Isidore; the other *prisca*, or ancient. In reality, then, up to the 6th century there was no regular collection of ecclesiastical laws in the western church. This want was at that period supplied by Dionysius Exiguus, a learned monk, who published a celebrated collection, which has ever since borne his name. It contained the principal points of the legislation of both branches of the church: the 30 canons of the apostles, then those of Nice, Ancyra, Neo-Cæsarea, Gangra, Antioch, Laodicea, Constantinople, and Chalcedon, translated from the Greek; the 21 canons of Sardica, from the Latin original, together with 138 enacted in different councils of Africa. These formed the first part. The second embraced the decretals of the popes Siricius, Innocent I., Zosimus, Boniface I., Celestine, Leo the Great, Gelasius, and Anastasius II. These decretals were letters sent by the popes to different bishops or churches, containing those decrees which they deemed necessary for the maintenance of discipline and the good of religion. These, as is evident, formed no unimportant part of church law. To the above mentioned were afterward added the decretals of the popes Hilarius, Felix II., Simplicius, Hormisdas, Symmachus, and Gregory II. The collection of Dionysius thus augmented was presented in the 8th century to Charlemagne, by Pope Adrian I., when the former came to Rome. Adrian did not give it any new public authori-

ty; yet from the fact of his having presented it, and from the *quasi* sanction thereby bestowed, it acquired great importance, and was called emphatically the *Codex Canonum*, or code of canons. Such were the principal documents through which access could be had to the knowledge of ecclesiastical legislation during the first nine centuries of the Christian era.—Thus far the science of ecclesiastical legislation had advanced in a regular and more or less uniform way. The churchmen had copied the forms of the old civil lawyers, and many made ecclesiastical polity the study of their lives. With the destruction of the Western empire, and the universal subversion of all the ancient landmarks of civilization and learning, the church law had to undergo some of the calamities of the age. The barbaric rulers often brought charges against leading ecclesiastics, either for the purpose of confiscating the property of the church, or of revenging the condemnation of their vices; and as the knowledge of canon law had shared in the decline of all science, the churchmen were left unprotected, from a want of acquaintance with laws which would have extricated them from their difficulties. A new collection was therefore required, and did in fact appear, but unfortunately the real erudition of the work was tainted by an inexcusable spirit of impetuosity on the part of the author. He gave himself a feigned name, that of Isidore Mercator (merchant), or Peccator (sinner). It is not very clearly known who he really was. The most probable opinion seems to be that his real name was Benedictus Levita, or the deacon, living at Mentz in the 9th century. The documents of which this collection was composed can be divided into three classes. There were some perfectly genuine, and attributed to their real authors; next, others substantially so, but published under the name of popes or councils to whom they did not belong; others, again, were altogether spurious, and perhaps invented by Isidore himself. The English Bishop Beveridge, after much erudite and patient toil, discovered that all the decrees or letters invented by the impostor were in reality nothing but tissues of passages selected from the canons of councils, epistles of popes, and works of ecclesiastical writers, especially of the 5th and 6th centuries. Isidore was everywhere held in honor, till on the revival of letters doubts arose as to the genuineness of parts of his work. During this time the collection of John Scholasticus, who flourished in the 6th century, was the principal one in the East. Photius revised it, and added many important laws, and it remains the basis of the legislation of the Greek church. Up to the 13th century the principal collections in the West were those of Burchard, Ivo, and Cardinal Deusdedit. At last, however, the light dawned, sciences and literature began to be cultivated, and the civil law of the Roman empire became the subject of profound and toilsome investigation. Gratian, a Benedic-

time monk, a native of Tuscany, undertook a new collection of canon law, and published in 1151 his *Concordantia Discordantium Canonum*. This was composed of various texts of Scripture, of the *Canones Apostolici*, of the decrees of general and particular councils, of the decretal letters of popes, of extracts from the writings of the fathers, and of the enactments of the old civil law of the empire, or of the Frankish kings. It received afterward the title of *Decretum*, by which name it is now known. It contains many spurious documents, which were for the most part taken from the collection of Isidore. With all its faults, however, it is a wonderful work, considering the age in which it appeared. In more recent times, when general attention had been called to the inaccuracies of the *Decretum*, many attempts have been made to correct it. Antoninus Augustinus, a learned canonist of the 16th century, devoted a great deal of time and pains to this object. A commission was appointed by Pope Pius IV. (1559-'65) to attend to this important work, which was accomplished during the pontificate of Gregory XIII. (1572-'85). The persons composing it are commonly known under the name of Roman correctors.—After Gratian many learned canonists either published new collections, or improved or commented on those already existing. Among these were Bernard of Pavia, Gilbert and Bernard of Compostella. However, their works lost almost all their importance on the publication of the collection of Pope Gregory IX. (1227-'41). Gregory has been truly styled the Justinian of canon law. He saw the necessity of a more authentic work than that of Gratian, and intrusted the execution of this idea to St. Raymond de Pennafort, a learned Dominican friar. He faithfully fulfilled his trust, and in 1284 promulgated the celebrated five books of decretals. These embraced all the laws of the church then in force, containing those texts of Scripture which referred to disciplinary matters; the decretal letters of the popes, from Gregory the Great to Gregory IX. (590-1241); the *Canones Apostolici*; the decrees of the councils, from that of Antioch to the fourth general one of Lateran (1215); together with many passages of the fathers, which embodied generally received customs or salutary regulations. In publishing this collection, Gregory gave it the approbation of the holy see, and commanded it to be received as authentic in all ecclesiastical tribunals, and in all schools of law. Boniface VIII. added in 1298 another book to the five of Gregory IX. It contained the canons of the second general council of Lyons, together with the different decrees issued by himself. It was called the sixth book of decretals, and received the same authenticity that had been given to the others. Such, too, was the collection made by Clement V. (1305-'14), which embraced various decrees of this pope, together with those of the general council of Vienne.

These canons commonly receive the name of Clementine, though originally called the seventh book of decretals. Next came two collections, known under the title of *Extravagantes*, laws, as it were, wandering outside of the regular code. The first contains the decrees of John XXII. (1316-'34), the other those of the popes from Urban IV. to Sixtus IV. (1261-1484). These different collections, beginning with that of Gregory IX., form what is called the *jus antiquum*, or ancient law, in contradistinction to the *jus recente*, or modern law.—After the great schism of the West, the general council of Constance, convoked in 1414 to put an end to that schism, passed decrees for the extirpation of abuses, and recommended the pontiffs to prosecute the good work with vigor; but the many and incessant troubles that distracted the attention of Rome rendered this extremely difficult. When Luther raised the standard of opposition to Rome, a general council was convoked at Trent in 1545, and set to work in good earnest to reform the Catholic body. To this effect many new enactments had to be adopted, and the disciplinary decrees of the council of Trent form the basis and principal part of modern canon law. Besides these, there are various bulls and briefs of the popes issued for the most part to execute or to explain more fully the canons of Trent. These are precisely the same documents that were anciently styled decretals. They are to be found in the *Bullarium*, an immense work, first commenced by a Roman lawyer, Laertius Oherubini. He began with Leo the Great, (440), and intended to bring his work down to Sixtus V. (1585), but died before completing it. His son, Angelo Maria, however, finished it. There is also the *Bullarium Magnum*, published by Jerome Mainardi, containing the papal letters or bulls, from those of Leo the Great to those of Clement XII. (1740). There is another one containing the bulls of Clement XI. (1700-'21), and another again embracing those of Benedict XIV. (1740-'58). The *Bullarium* is yet constantly published, and has been brought down to the reign of Gregory XVI. (1831-'46). The decisions of the congregations of cardinals enter also into the present code. They are binding for the whole church when given in answer to general questions, or when especially declared to be so. Lastly, the *concordats* with different princes or governments, which are made in order to regulate those modifications of general legislation that the exigencies of the times or other circumstances may demand, are a prominent feature in the present state of ecclesiastical polity, and are gradually effecting important changes, by making what was before but a solitary exception to become an almost universal rule.—This is the history of canon law in its general bearings on the Catholic church. We have refrained from mentioning those details which have reference to particular provinces or nations. Canon law, in its present state, is almost as voluminous as

was the ancient Roman code. While one small volume in octavo contains all the dogmatical decrees on matters of faith, ponderous folios are filled with disciplinary decrees. This is inevitable. A dogmatical decree remains always in force, is never modified or repealed; discipline necessarily undergoes modifications. —The canon law is used, under certain restrictions, in the ecclesiastical courts of England and the courts of the two universities.

CANOPUS, a star of the first magnitude in the constellation Argo Navis. It is in the end of the rudder, and is 37° from the south pole. It is therefore a southern circumpolar star, and is never visible in the latitude of the northern United States.

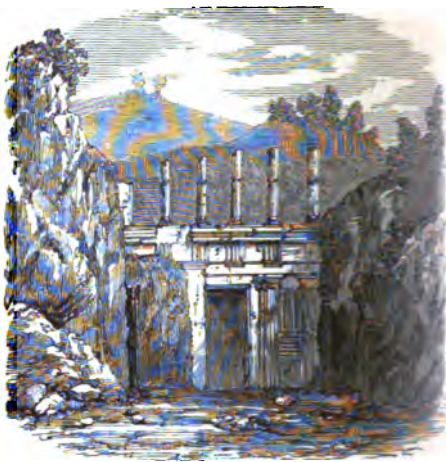
CANOPUS, or **Canopus**, a city of Egypt, in lat. 31° N., 15 m. N. E. of Alexandria, at the mouth of the W. branch of the Nile, which was thence called the Canobic branch. In the times of the Pharaohs it was an important city, and the chief port of Egypt, but it was ruined by the growth of Alexandria. It contained a temple of Zeus Canobus, and a famous and much frequented shrine and oracle of Serapis. It was a great resort of foreigners, especially of Greeks, and was notorious for its dissolute morals. Traces of its ruins are visible a few miles from Aboukir. The Greeks had a legend that the city derived its name from Canobus, the pilot of Menelaus, who on the return from Troy was bitten by a snake and died, and was buried there. But it probably derived its name from Canobus, an Egyptian god, which was represented in the shape of a jar with human head. Such a figure is frequently found on the coins of the city, and was doubtless symbolical of some deity; but there is great uncertainty about his true appellation, as some critics maintain that Serapis was the chief god worshipped at Canopus. The jar god is mentioned by only one ancient writer, Rufinus, who wrote in the 4th century and is not considered good authority.

CANOSA (anc. *Canusium*), a town of Italy, in the province of Bari, 14 m. S. W. of Barletta; pop. about 10,000. It contains a cathedral of the 6th century, the remains of a triumphal arch near the river Ofanto, of a splendid amphitheatre, and the tomb of Bohemond, prince of Antioch. Canusium was subdued by the Romans in 318 B. C., until which time it had been hostile to Rome ever since the Samnite war. Herodes Atticus constructed an aqueduct to supply it with good water. The Romans called the inhabitants *bilingues*, as they



Canopus.

spoke both Greek and Oscan. The mule drivers of Canusium were noted for their skill and were always selected by Nero as his charioteers. The remains of the Roman army af-



Ancient Tomb at Canosa.

ter the defeat of Cannæ, about 8 m. distant, took refuge in Canusium. It was on the direct route from Brundisium (Brindisi) to Rome. Remarkable ancient tombs discovered in 1893, in the vicinity of Canosa, whose contents were sent to the museum of Naples, were described by Millin (Paris, 1813).

CANOSSA, a town of Italy, in the province and 24 m. S. W. of Modena; pop. about 1,200. It contains a castle in which the emperor Henry IV. performed three days' penance, bareheaded and barefooted, before Pope Gregory VII. in January, 1077.

CANOT, Theodore, an adventurer and slave trader, born at Florence about 1807. He was the son of a captain and paymaster in the French army. After an ordinary school education he shipped as a seaman in the American ship *Galatea*, of Boston, from Leghorn to Calcutta. He made several voyages from Boston: was shipwrecked near Ostend, and again on the coast of Cuba. At Havana he shipped on a slaver, and made his first voyage to Africa in 1826, landing at the slave factory of Bangalang, on the river Pongo, Senegambia. After quelling a mutiny on board and helping to stow away 108 slaves, he entered the service of the owner of the factory, a mulatto named Ormond, but commonly called "Mongo John." In 1827 a friend in Havana consigned to him a slave schooner, which he loaded with 217 negroes, receiving \$5,565 commission, while the Cuban owners realized a clear profit of \$41,438. Canot then collected a stock of slaves for his newly established depot at Kambia near Bangalang. Another vessel was sent out to him from Cuba; but the captain dying, he took command and sailed for Regla, but was soon

captured by two British cruisers after a hard fight. He made his escape in a small boat with one companion, and reached the river Pongo. In May, 1828, his factory and goods were destroyed by fire. He afterward purchased a vessel at Sierra Leone, in which with a cargo of slaves he sailed to Cuba. Three more expeditions soon followed; in the first he lost 300 slaves by smallpox; in the last he was taken by the French and condemned to 10 years' confinement in the prison of Brest, but a year after he was pardoned by Louis Philippe. He returned to Africa, and was the pioneer of the slave traffic at New Sestros, from which in 1840 he shipped to Cuba 749 slaves. Obtaining a grant of land at Cape Mount, he established in 1841 a trading and farming settlement under the name of New Florence. He made a trip to New York some time afterward. In March, 1847, New Florence was destroyed by the British, who suspected it to be a slave station, and Canot removed to South America, where he engaged in commerce. He resided for some time in Baltimore, and finally received from Napoleon III. an office in one of the French colonies in Oceania. A narrative of his adventures from his own notes, by Brantz Mayer, was published in New York in 1854.

CANOVA, Antonio, an Italian sculptor, born at Possagno, Nov. 1, 1757, died in Venice, Oct. 13, 1822. He sprang from an ancient family, who for generations had followed the trade of stone cutting, and he was put to the same trade. In his ninth year he executed two small shrines of Carrara marble, and the aptitude which he displayed arrested the attention of Giovanni Falieri, a Venetian senator, who placed him in 1771 under the instruction of Torretti, a Bassano sculptor, who in 1773 removed to Venice. Here Canova in 1774 received from his patron an order for the group of Orpheus and Eurydice. This was followed by the group of Dædalus and Icarus, and several other works, which enabled the artist to prosecute his studies in Rome, Falieri having obtained for him a pension from the Venetian government of 300 ducats a year for three years. He visited Naples, Herculaneum, and Pompeii, and, taking every opportunity of improving his knowledge of the works of antiquity, soon produced his great statue in marble of "Apollo crowning himself with Laurel;" but his reputation was not firmly established until the completion of his "Theseus vanquishing the Minotaur." His next undertaking was a monument in honor of Olement XIV.; he obtained permission from the Venetian senate, which had pensioned him, to settle permanently at Rome, where after four years the monument was opened to public inspection in 1787. By 1792 he had completed another cenotaph to the memory of Clement XIII., and was overwhelmed with commissions. Among the many works which appeared from his chisel, several of them repetitions of former ones, from 1795 to 1797, his groups of Cupid and Psyche stand-

ing, and Venus and Adonis, are the most celebrated. In 1798 he visited Germany, and on his return retired to his native village, where he devoted himself to painting. His picture of the "Descent from the Cross" is especially noteworthy. On his return to Rome he produced his "Perseus with the Head of Medusa," which by public decree was placed in the Vatican. In 1802 Napoleon invited him to Paris, where he modelled a colossal statue of the emperor, which was not completed before 1808, and afterward passed into the possession of the duke of Wellington. In 1805 he executed his "Venus Victrix," and in the same year he completed his monument of Christina, archduchess of Austria, erected in the church of the Augustines at Vienna. This is considered the masterwork of his monumental productions. He revisited Paris twice: in 1810, when he modelled the bust of Maria Louisa, and executed the statue of Lætitia Bonaparte, for which in 1819 the duke of Devonshire paid £1,300; and in 1815, when he removed to Italy some of the works of art which had been carried to Paris by Napoleon. His reception at Rome was brilliant; the pope inscribed his name in the golden book of the capital, and conferred upon him the title of marquis of Ischia, and a pension of about \$3,000. For his native village he designed a temple after the model of the Parthenon of Athens and the Pantheon of Rome, of which the foundation stone was laid July 11, 1819. He executed the bass reliefs, and a great altarpiece for the interior, which he had begun 20 years before. Some of his most popular works were wrought by him shortly before his death, as the group of Mars and Venus, the colossal figure of Pius VI., the Pietà, the St. John, and the recumbent Magdalen. Among his later works was a Washington, of colossal size, in a sitting attitude, which was purchased for the state house at Raleigh, N. C., and was destroyed by fire in 1831. In May, 1822, he paid a visit to Naples, where he had undertaken an equestrian statue for the king. On his return his health became more and more impaired, and he died shortly afterward at Venice. The last work from his hand was a colossal bust of his friend Count Cicognara. His remains were deposited in the church of Possagno. The same monument which he had designed for Titian was dedicated to his memory in 1827, in the church de' Frati of Venice, and another monument to his honor was raised by Pope Leo XII. in the library of the capitol. Canova's works, which are very numerous, and were produced with great rapidity, are classed as heroic compositions, compositions of grace, and sepulchral monuments and reliefs. The large fortune which he acquired was almost wholly distributed in works of charity, and he was especially liberal to artists, for whom he established prizes, and he endowed all the academies in Rome. He was ennobled and received various orders of knighthood. Since his death his

reputation as a sculptor has greatly declined.—See "The Works of Canova," engravings, by Moses (3 vols., London, 1828); *Descrizione delle opere di Canova*, by Albrizzi (5 vols., Pisa, 1821-'5); *Canova et ses ouvrages*, by Quatremère de Quincy (Paris, 1834); and the biographies by Missirini (2 vols., Prato, 1824), Cicognara (Venice, 1823), Rosini (Pisa, 1825), and D'Este (Florence, 1864).

CANOVAI, Stanislas, an Italian ecclesiastic and mathematician, born in Florence, March 27, 1740, died there, Nov. 17, 1811. Having taken holy orders, he officiated as professor of mathematics at Cortona. In 1788, as a member of the academy of antiquities, he contended for the prize which was offered for an essay on Americus Vesputius. He opposed the common opinion that Columbus was the first discoverer of the mainland of America, claiming that Vesputius one year before him had touched upon the northern part of the continent, and had afterward landed in Brazil. His paper gained the prize, but produced much controversy. He published an Italian translation of Gardiner's tables of logarithms, and had a good reputation as an ecclesiastic.

CANROBERT, François Certain, a French marshal, born in the department of Gers, June 27, 1809. In 1826 he entered the military school of St. Cyr, and in 1830 enlisted as a private soldier. In 1835 he went to Africa, and during the war in the Oran country was promoted to a captaincy. He distinguished himself in 1837 at the storming of Constantine. He was made a major in 1842, lieutenant colonel in 1846, colonel in 1847, and brigadier general in 1850. After the *coup d'état* of 1851, in which he commanded the troops most actively engaged at the close, he was one of the commissioners sent to the departments to expedite the prosecution of those who had attempted to resist that act. In 1853 he was appointed general of division, and in 1854, upon the formation of the army of the east, he was placed in command of the first division. He set out for the Crimea on March 13, and was slightly wounded in the battle of the Alma. After the death of St. Arnaud he took command of the army, and defeated the Russians at Inkerman, where he was again wounded (Nov. 5, 1854). The general dissatisfaction in the allied armies at the slow progress of the siege of Sebastopol, and questions as to the ability of both the English and French commanders, prompted Canrobert to resign to his subordinate, Gen. Pélissier (May 16, 1855), after which he resumed command of his division. His health failing, he returned to France, and was made marshal March 18, 1856, and subsequently senator. From the British queen he also received the grand cross of the bath. In 1859 he took command of the 3d corps of the army of the Alps, served with great distinction at Magenta, and at Solferino effected a movement which gave valuable assistance to Marshal Niel. When France declared war against Prussia in

1870, Canrobert commanded the 6th army corps. He participated in the battles around Metz, and after the defeat at Gravelotte (Aug. 18) was shut up with Bazaine in that fortress, and on its capitulation, Oct. 27, was sent a prisoner to Germany. In October, 1872, he was made a member of the supreme council of war, which was intrusted with the organization and administration of the army.

CANSTATT, or **Canstadt**, a town of Württemberg, on both sides of the Neckar, 2 m. N. E. of Stuttgart; pop. in 1872, 11,804, chiefly Protestants. The old town, on the right bank of the Neckar, is much inferior in appearance to its more modern suburbs, with the chief of which, situated on the left bank, it is connected by a stone bridge, built in 1837. Between the town and one of its suburbs is one of the most remarkable buildings in Germany, the Wilhelma palace, in the Saracenic style, finished in 1861 by the late King William, and intended as his summer residence. The site of Canstatt was so chosen as to make it one of the chief centres of the Neckar trade; and it has also a considerable industry. Cotton cloth, hosiery, enamelled cloth, and other goods are manufactured. The town derives much of its importance from its mineral waters. There are 40 springs, yielding a lukewarm saline water used for drinking and bathing. The most extensive baths are on the island in the Neckar opposite the town. On the surrounding hills are several noteworthy buildings: the Rosenstein, a country residence of the royal family; a royal villa completed in 1864; and on the hill called the Rothenberg a Byzantine chapel erected in memory of Queen Catharine, who died in 1819, occupying the site of the ancient castle of Württemberg. Canstatt appears in history before the time of Charlemagne.

CANSTEIN, Karl Hildebrand, Freiherr von, the originator of a system for the diffusion of Biblical knowledge in Germany, and founder of the Canstein Bible society of Halle, born at Lindenberg, Aug. 4, 1667, died in Berlin, Aug. 19, 1719. He studied jurisprudence, made an extended journey through Europe, and in 1689 became attached to the court of Brandenburg as chamberlain to Frederick III. He resigned his office to accompany as a volunteer the army sent from Brandenburg into Flanders, serving with them during several campaigns before the peace of Ryswick. Illness, however, compelled him to abandon military life, and he returned to Berlin. Here he became acquainted with Spener and other prominent theologians, and from this time he began to devote his attention to the best method for the diffusion of religious knowledge, but published nothing till 1710, when he explained the plan upon which he had decided, in a work entitled *Ohnmaßgebender Vorschlag, wie Gottes Wort den Armen zur Erbauung um einen geringen Preis in die Hände zu bringen sei*. Aided by subscriptions, he had by 1713 published the

first edition of the New Testament printed with type kept permanently standing, and soldered together at their lower ends. In 1716 he printed the whole Bible by the same method; in 1717 a still larger edition appeared in a larger size; and in 1722, after his death, Polish and Bohemian translations also appeared. These were the beginnings of the Canstein Bible establishment, which in 1785 took still more definite form through the erection of a special printing office, and rapidly increased its facilities for the printing of large editions by the adoption of the stereotype process and the purchase of the best presses. He also published a concordance of the Gospels (Halle, 1718), and a biography of Spener (1729). The history of the Canstein establishment, by Bertram, was published at Halle in 1868. (See *BIBLE SOCIETIES*.)

CANTABRIA, a district of ancient Spain, bordering on the S. coast of the bay of Biscay, and including, according to some of the earlier geographers, what are now the provinces of Oviedo, Santander, Biscay, and Guipuzcoa. After the Roman invasion the name was restricted to the western half, included in that part of the peninsula known as Hispania Tarraconensis. On the east were the territories of the Autrigones, Varduli, and Vascones; on the west the river Salia separated it from the country of the Astures; and the southern boundary was formed by the Cantabrian mountains. The river Ebro (Iberus) takes its rise near the district occupied by the Tuisi, one of the five principal tribes (the Plentauri, Varduli, Autrigones, Conisci or Concani, and Tuisi) into which the inhabitants were divided. Pliny mentions nine cities of Cantabria, of which Juliobriga alone was of any importance. —The Cantabri were a warlike people, and of all the Iberian nations opposed the stoutest resistance to the Romans, and, though more than once forced into nominal subjection, were never wholly subdued. A portion of them acknowledged the supremacy of Augustus, but the bulk of the nation preserved their independence among the fastnesses of their mountains. After their first partial subjection, 25 B. C., they several times revolted, and were almost exterminated by Agrippa in 19.

CANTABRIAN MOUNTAINS, a range in the N. part of Spain, formed by a W. prolongation of the Pyrenees, and extending from that chain parallel with the S. shore of the bay of Biscay, W. to Cape Finisterre. They bear various names in the different provinces through which they pass, the best known being those of Sierras de Aralar, Salvada, and Obadongo, mountains of Asturias, and Sierra de Peña-marella. Some of the summits are rugged, precipitous, and clad with magnificent forests; others are crowned with perpetual snow. The maximum elevation is about 10,000 ft.

CANTACUZENUS, or *Cantacuzene*, the name of a distinguished Græco-Wallachian family, claiming direct descent from the Byzantine emperor

John Cantacuzenus. They have for several centuries occupied a prominent position, generally in connection with the affairs of the Danubian dependencies of Turkey. **I. Serban**, waywode of Wallachia, under the title of Serban II., born about 1640, died in 1688. His father, Constantine, had married the daughter of Serban I., and had acquired an influence in the principality which roused the fear of Gregory Ghika, a waywode in his time. Constantine was assassinated, but his death only served to direct the popular indignation against Gregory, and to contribute to the advancement of Serban. Gregory, who betrayed his suzerain, the sultan, soon after fled from the country, but was reinstated on the fall of his successor Drakula, and the Cantacuzene family was exposed to long-continued persecutions; but after some years Ghika was again deposed, and Serban returned, became prime minister, and in 1679 was appointed waywode. He improved the administration of justice, and promoted industry and education; but finding all his plans for the advancement of the country defeated by Turkish oppression, he formed a plan to secure the independence of the principality. He took advantage of the defeat of the Turks before Vienna, where he and his countrymen assisted the enemy while pretending to aid the Ottoman army, to enter into negotiations with Germany and Russia, both powers giving him hopes of assistance. He raised a considerable army, but died on the eve of executing his schemes. **II. Demetrius**, brother of the preceding, hospodar of Moldavia, appointed in 1678. He had to contend with rivals, and his weakness and tyranny rendered him so odious to the Moldavians that in 1679 they revolted against his government and obliged him to take refuge in Poland. Though in disfavor at the Turkish court, he was in 1684 restored to power by the sultan's aid; but in 1685 the grand vizier Ibrahim Pasha finally removed him from his office. **III. Stephen**, waywode of Wallachia, appointed in 1714. His intrigues with the court of Vienna, having for their object the release of the principality from the Turkish yoke, excited suspicion at Constantinople, and he was arrested, deposed, and executed in 1716. **IV. Alexander and George**, officers in the army of Russia, in which country the family had taken up their residence after the execution of Stephen, distinguished themselves as members of the Hetæria before and during the Greek revolution of 1821. They served in Moldavia under Ypsilanti; and both wrote accounts of the conflict, and works in aid of the cause.

CANTACUZENUS, Johannes, a Byzantine emperor and historian, born in Constantinople in the beginning of the 14th century. During the reign of Andronicus II. he was "great domestic," or first lord of the bedchamber. He was a relative of the imperial family, and his talents gained for him the confidence of the people. Andronicus and his grandson and legitimate

successor, Andronicus III., were in constant dispute; and when in 1328 Andronicus III. ascended the throne, Cantacuzenus, who had sided with him, was called to the supreme administration of affairs, and was also made generalissimo of the Byzantine forces. The attacks of the Ottoman Turks gave Cantacuzenus an opportunity to display his military skill. He was unsuccessful against them, but rendered valuable service to the empire in reuniting to it Lesbos and Ætolia, and bringing to an end the piracies of the Genoese in the Ægean. The emperor, dying in 1341, left his son, John Palæologus, nine years of age, to the guardianship of Cantacuzenus. He soon aroused the jealousies of the empress mother, Anne of Savoy, who declared him a traitor, and to save his life he assumed the purple at Adrianople in 1342. The civil war which resulted, and which lasted five years, was finally concluded by his admitting his ward Palæologus as the colleague of the throne, and giving him his daughter in marriage. But the jealousy of the empress mother raised a new sedition in 1353, which continued till Palæologus took Constantinople in 1355. A short time afterward Cantacuzenus abdicated, and retired to a monastery, where he assumed the name of Joasophas Christodolus, devoted himself to literature, and produced a history of his life and times from 1320 to 1360 (printed in Paris in 1645 in 3 vols. folio, in the collection of the Byzantine historians). He also wrote several theological works, among which is a defence of Christianity against Mohammedanism, which drew from Pope Gregory XI. a commendatory letter. The only part taken by Cantacuzenus in political affairs after his abdication, was his successful effort to dissuade his son Matthias from an armed attempt to secure the succession. Matthias abandoned the contest in 1357. Cantacuzenus ended his days in his monastic retirement, as did also his wife, Irene, who had retired to a convent under the name of Eugenia. It is not certain in what year he died; but several authorities give the date as 1411, which would have made him fully 100 years old.

CANTAGALLO, an inland town of Brazil, in the province and 80 m. N. E. of Rio de Janeiro; pop. 4,200. The streets are regular, and the houses mostly well built. In the circular market place stands the church between two parallel streets. Cantagallo was founded by *garampeiros* or gold-hunters and smugglers, who, having discovered rich mines there, quietly took possession of the place, and for a long time forwarded enormous quantities of the precious metal to the capital, the source of which the government was long unable to discover. At the commencement of the present century the mines were almost exhausted, and the inhabitants were obliged to direct their attention to agricultural pursuits, which still continue to be their chief occupation.

CANTAL, a S. department of France, mostly formed of the S. part of ancient Auvergne,

bounded N. by the department of Puy-de-Dôme, E. by Haute-Loire and Lozère, S. by Aveyron, and W. by Lot and Corrèze; area, 2,212 sq. m.; pop. in 1872, 231,687. It is nearly covered with mountains of volcanic origin; the highest summit is the Plomb du Cantal, from which the department takes its name. The chief rivers are the Dordogne, Alagnon, and Truyère. The climate is severe, the snow generally lying on the mountains for several months together. The principal agricultural portion of the department is on a level plateau between Murat and St. Flour. Chestnuts abound and are largely used for food. Great quantities of butter and cheese are produced. There are a few factories of coarse woollens and linens, coarse lace, copper and brass, &c. Many natives of the department annually emigrate in search of employment. These are generally known as Auvergnats, and distinguished for thrift and industry. The department is divided into the arrondissements of Aurillac, Mauriac, Murat, and St. Flour. Capital, Aurillac.

CANTARINI, Simone, an Italian painter, born at Pesaro in 1612, died at Verona, Oct. 15, 1648. He was the pupil and perhaps the closest imitator of Guido Reni, and one of the best of the Italian portrait painters. A portrait by him of his master in the academy of Bologna is said to be one of the best painted heads in the world. He was of a vain and intolerant disposition, and died in the service of the duke of Mantua, not without suspicions of poison. He executed a number of masterly etchings, which are highly prized by print collectors.

CANTEMIR. I. Demetrias, hospodar of Moldavia, born Oct. 26, 1673, died Aug. 23, 1723. His father, Constantine, held the same office from 1685 to 1693, and his brother, Antiochus, from 1695 to 1701. Demetrias succeeded by appointment of the Porte in November, 1710; but in 1711 he revolted against the Porte and went to Russia, where he received from Peter the Great extensive domains in the Ukraine, with the right of sovereignty over them, and the rank of a prince of the Russian empire; and he was also made privy councillor. He aided in the establishment of the academy of St. Petersburg, and was a member of the kindred institution at Berlin. He was proficient in 11 languages, and the author of many works on Turkey, the music of the Turks, Moldavia, and the Mohammedan religion, the best known of which is the "Growth and Decay of the Ottoman Empire," written in Latin, which has not been published in the original, but has been translated into various languages (English by Tindal, 2 vols. fol., London, 1734).

II. Antiochus, or Constantine Demetrias, a Russian poet and statesman, son of the preceding, born in Constantinople in 1708 or 1709, died in Italy in 1744. He was educated at St. Petersburg, officiated as Russian minister at various courts of Europe, and gained distinction by his diplomatic, but still more by his literary

achievements. Among his most noted works are his Russian translations from the classics, and his eight books of satires, which have been translated into French and German. •

CANTERBURY, a city of England, county of Kent, on the river Stour, 52 m. E. S. E. of London; pop. in 1871, 16,508. The city has no commercial or manufacturing importance, but is one of the markets of the rich surrounding agricultural district; and its fine situation has made it a favorite residence, as is evident from the numerous villas and seats in the vicinity. Among the public buildings, besides the churches and the charitable establishments, are the guildhall, markets, the corn and hop exchange, and the philosophical museum. There is a cavalry barrack near the city. Its celebrity is derived from its historical and ecclesiastical associations. The archbishop of Canterbury is

primate of England. The ecclesiastical province includes the dioceses of Canterbury, Bangor, Bath and Wells, Chichester, Ely, Exeter, Gloucester and Bristol, Hereford, Lichfield, Lincoln, Llandaff, London, Norwich, Oxford, Peterborough, Rochester, St. Asaph, Salisbury, Winchester, and Worcester. The diocese of Canterbury comprises 352 benefices, and the chapter consists of a dean, six canons, two archdeacons, six preachers, and five minor canons; the income of the archbishop is £15,000 a year, and he is the patron of 149 livings. The town existed in the time of the Romans, who called it *Durrovernum* (from the ancient British *Durwher*), and many Roman coins and remains have been found in and near the city. It was the capital of the Saxon kingdom of Kent, and it was here that Augustin baptized Ethelbert and 10,000 Saxons in 597. The great



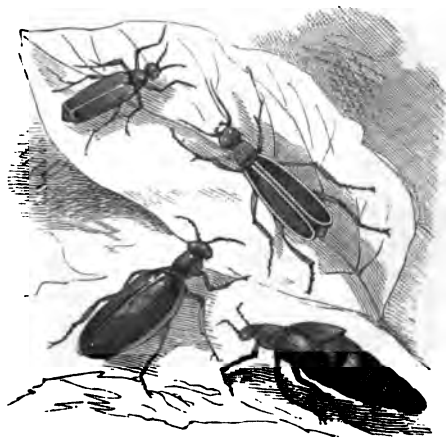
Canterbury Cathedral.

cathedral, consecrated in 1130, was restored and beautified not long before the accession of Queen Victoria, making it one of the most beautiful interiors in England. The great tower is of remarkable beauty. The windows are of painted glass, and the colors are exceedingly rich. The length of the structure is 574 ft., extreme breadth 159 ft. The crypts beneath are the finest in England, and contain several chapels. The cathedral was founded by Archbishop Lanfranc, enlarged and completed by Anselm, and consecrated by Archbishop Corbel, in presence of Henry I. of England, David, king of Scotland, and all the English bishops. Augustin was the first archbishop, and died here between 604 and 614. The celebrated archbishop Thomas à Becket was murdered before the high altar Dec. 29, 1170. There are numerous monuments in the cathedral; among others those to the memory of Henry IV. and of the Black Prince. Several times

the cathedral has seriously suffered from fire. In 1174 the choir and other portions of the interior were consumed; and on Sept. 3, 1872, a portion of the roof 150 ft. in length was burned, and the interior of the cathedral was damaged by fire and water. There are several fine old churches in Canterbury, one of the most interesting of which is St. Martin's. In St. Dunstan's the head of Sir Thomas More, which had been buried by his daughter, was found in 1835. There are also various architectural relics of past ages. One of the most interesting of these, the great Augustinian monastery, long used as a brewery, has been redeemed from its modern uses by the munificence of Mr. Beresford Hope, who purchased it and presented it to the church as a missionary college, defraying the expense of the restorations and enlargements. There are several educational establishments in the city: the grammar school, an endowed school attached

to the cathedral, the national British and infant schools, a blue coat and a gray coat school. By the liberality of Alderman Simmonds, a field called the Dane John, containing a high mound, was laid out and converted into a very pleasant garden for public use. The borough is governed by six aldermen, one of whom is mayor, and 18 councillors, and returns two members to the house of commons.

CANTHARIDES (Gr. *κυνθάρης*, a beetle), coleopterous insects of several species, made use of in medicine. The most preferred is the *cantharis vesicatoria*, procured mostly in the southern parts of Europe, but to some extent in all the temperate regions of Europe and western Asia. A species called the *C. vittata*, or potato fly, is common upon the potato plant of the United States; it is much used as a substitute for the foreign fly, being by many regarded as equally efficient, and is even adopted in the pharmacopœias as official. Other species, too, are known in this country, and are



Cantharis vesicatoria.

in some parts exceedingly abundant. The potato flies appear on the plant in the mornings and evenings of August; during the day they disappear in the earth. They are collected by shaking them off into a basin of hot water. They are from one half to two thirds of an inch in length, and of a shining golden green color. —Cantharides are imported from the countries on the Mediterranean, and from St. Petersburg. The Russian flies, which may be distinguished from others by their superior size and peculiar copper hue, are the most esteemed. In the larva state the cantharides live in the ground upon the roots of plants. The flies of southern Europe usually swarm upon the trees in May or June, selecting such as the white poplar, privet, ash, elder, &c. The early morning is the proper time for collecting them, when they are in a torpid state, and will easily let go their hold. Persons protected with masks and gloves beat the trees, and flies fall upon a linen cloth spread to re-

ceive them. They are then deprived of life by being exposed to the steam of hot vinegar. This method of destroying them dates back to the times of Dioscorides and Pliny. When dry they are carefully packed. If kept in air-tight vessels, they will retain their properties for many years; but if exposed, they will soon putrefy, particularly if reduced to powder. For this reason they should be kept whole until wanted for use. Being then powdered and mixed with ointment or lard, they make a valuable preparation for blistering plasters. Care is required in its application, as troublesome sores may follow its use. Internally administered, the medicine acts as a stimulant, principally upon the urinary and genital organs; its use is attended with danger, as in large doses it acts as a powerful irritating poison.

CANTICLES, or *Song of Solomon* (the *ᾠδὴ Ἀσματῶν* of the Septuagint, the *Canticum Canticum* of the Vulgate), the fourth book of the Hagiographa, and the first of the so-called Megilloth, called Song of Songs from the beauty of its language and poetry. In a number of dialogues and soliloquies it gives a glowing description of the love and beauty of two lovers betrothed or bride and bridegroom; of rural scenes among the mountains of Lebanon and Hermon, among the hills and vineyards of Engedi, and in the environs of Jerusalem. It is ascribed to Solomon, whose palaces, gardens, chariots, horses, guards, and wives are mentioned, enhancing by the contrast the charms of calm rural life. In regard to its form, its plot, and the order of its parts, as well as to its subject, it has been variously classified by ancient and modern writers: by Origen, in the preface to his comments, as an epithalamium in the form of a drama, which is also the opinion of Lowth and Michaelis; by Boesuet as a regular pastoral drama of seven acts, giving the scenes of seven days, of which the last is the Sabbath; by others as a collection of songs or idyls. Adam Clarke regards it as a poem *sui generis*, composed for the entertainment of marriage guests. Its canonicity has also been a matter of controversy; it seems to have been in question with the Jews at the time of the Mishnah. Theodore of Mopsuestia, the friend of Chrysostom, attacked it most vehemently with arguments derived from the erotic character of the book, and was severely condemned for his attacks. Origen, who is said to have written ten books of comments on the Canticles, and his admirer Jerome, are among its most prominent defenders, supported by the circumstance that the book is contained in all the Hebrew copies of the Scriptures, in the translations of the Septuagint, of Symmachus the Jew, and of Aquila, and is mentioned in the most ancient catalogues of the church, commencing with that of Melito, bishop of Sardis, who lived in the 2d century. Modern criticism has also questioned the authorship of King Solomon, and several Aramaic words and some supposed to be of Greek origin have been quoted as evi-

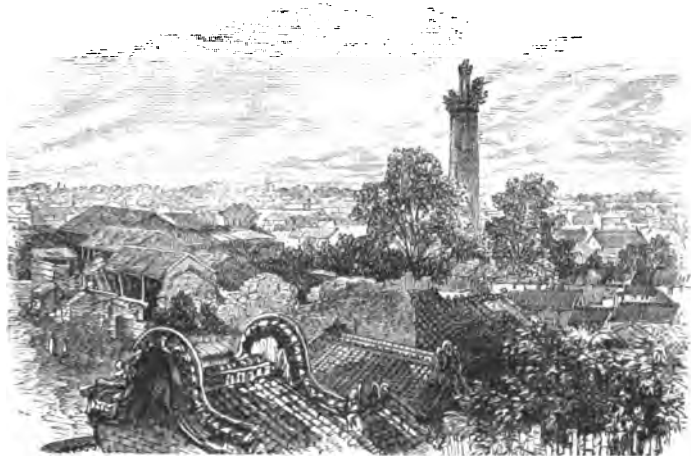
dences against the antiquity of the book, though none of these is conclusive. But no subject has excited more controversy, or has been a source of more learned and contradictory disquisition and scrutiny, than the question of the literal or allegoric and mystic sense of the book. Many modern critics, both among Jews and Christians, contend for the literal sense. They also widely differ in the interpretation of the meaning and object of the book. The more ancient opinion defends the allegorical, religious, and sacred character of the songs. Thus, on the one side, the subject is the love of a shepherd, of a youthful king, &c., and the beloved is a shepherdess, an Ethiopian princess, or, according to Grotius and others, the daughter of Pharaoh, wife of Solomon; while, on the other side, love appears as a spiritual affection, as the love of God for Israel, his chosen but abandoned people, or of Christ for the church, or as the connection between the divine and human nature. Aben Ezra finds in the book the hopes of redemption for oppressed Israel; Kaiser, the restoration of the Mosaic law by Zerubbabel and Ezra; Hug, an attempt made in the time of Hezekiah to reunite the remnant of the ten tribes to Judah; others, the love of wisdom, and even the search for the philosopher's stone. Among the more than 300 commentators on this book, the following belong to the best known: Origen, Jerome, Eusebius, Athanasius, Gregory I., Luther, Erasmus, Umbreit (1820), Ewald (1826), Rosenmüller (1830), Krummacher (1839), Delitzsch (1851), Hengstenberg (1853), Ginsburg (1857), Weissbach (1858), Stuart (1860), Renan (1860), Houghton (1865), and Grätz (1871). The last named writer finds in Canticles imitations of the idyls of Theocritus, and considers it a product of the Syro-Macedonian period which preceded the struggle under the Maccabees.

CANTILLON, Pierre Joseph, a French soldier, born at Wavre, in Brabant, in 1788, died in Brussels, July 13, 1869. He entered the French army in 1807, took part in several campaigns of Napoleon, was repeatedly wounded, and became a sergeant in the grenadier corps of the imperial guard. He was suspected of having fired at Wellington in Paris in December, 1815, and was arrested together with about 40 other subordinate officers of the imperial guard; but there was not sufficient evidence to convict him. The ex-emperor afterward sent him from St. Helena 1,000 francs for the cost of his trial.

CANTUUM, in ancient geography, the district in Britain which nearly corresponded to the present county of Kent. The inhabitants (Cantii) were spoken of by Cæsar as being the most civilized of the native British tribes.

CANTON. I. A city of Canton township, and the seat of justice of Stark co., Ohio, about 100 m. N. E. of Columbus; pop. in 1870, 8,660. It is situated on Nimishillen creek, in the midst of the finest wheat-growing district in the state. Bituminous coal and limestone are found in the vicinity. Considerable manufacturing is carried on. There is a high school, 6 grammar, 12 primary, and 3 corporate schools. There are three weekly newspapers, of which one is in German, and two monthly periodicals. The Pittsburgh, Fort Wayne, and Chicago railroad passes through it. II. A city of Fulton co., Ill., on the Toledo, Peoria, and Warsaw railroad, and the Buda and Rushville branch of the Chicago, Burlington, and Quincy railroad, about 50 m. N. by W. of Springfield; pop. in 1870, 8,308. It is situated in a fertile district, abounding in coal, and contains manufactories.

CANTON (properly *Quang-chow-foo*, pearl city of commerce), a city of China, capital of the province of Quang-tung, in lat. $23^{\circ} 7' N.$, lon. $113^{\circ} 14' E.$, about 45 m. from the sea, on the Canton river, near the junction of the Se-kiang and Pe-kiang; pop. about 1,800,000. It is about 7 m. in circumference, or 10 m. including the suburbs. It is built nearly in the form of a square, surrounded by a brick wall 15 to 20 ft. thick at the base and narrowing toward the top, pierced by 12 gates, at each of which is a guard house. The city is divided into two parts, separated by a wall with four gates. The



Canton, from the Temple of the Five Genii.

old town is inhabited by Tartars, and is the residence of the commander of the troops. The new town, on the south, contains the residence of the viceroy. On the S. E. and S. W. are the suburbs, with four forts and the foreign

warehouses with spacious gardens. Most of the streets are short, and are irregularly laid out, branching at all angles, and often continued through narrow gates or mere doorways. They are from 7 to 10 ft. wide, the houses often meeting across to keep out the sun. Unlike other Chinese and eastern cities, the streets are paved with flat granite blocks, and the sewerage is concealed. The houses are generally built of dark brown brick, one or two stories high. They are without verandas, and entirely open in front, closed only by suspended bamboo screens. The windows are small and rarely furnished with glass, paper, mica, and other transparent substances being substituted. The roofs are of unequal height, from a Chinese superstition that ill luck follows eaves which connect with each other in a continuous line. The roofing invariably consists of thin tiles laid in rows alternately concave and convex, the latter overlapping the former, and cemented with mortar. The houses contain from three to six apartments. The dwellings of the poorer classes are seldom more than mud hovels, containing but a single apartment. Stone is seldom used except about gateways. The shops are commodious and well stocked with goods. In the busy part every house is a shop; but there are two streets, China street and New China street, mostly resorted to by foreigners, where goods from nearly all parts of the world are to be found. Eating houses are numerous, and furnish a great variety of made dishes, in which rice, pork, puppies, cats,

pigs, and other favorite animals of the epicures of Canton. They also recruit the piratical sampans which infest the mouth of the Canton river and almost every portion of the coast.



Flower Boat.

The Tankia fleet is a home for the city's swarm of prostitutes. Between this floating city of outcasts and the point of landing at the foreign quarter is the anchorage of the great junks engaged in foreign Asiatic trade.—When a stranger of note arrives here with letters of introduction, he is generally received and hospitably entertained at the mansions of the merchants, especially the English and American, who have commercial and dwelling establishments at Macao and Hong Kong. For the accommodation of less fortunate travellers there are a couple of hotels, conducted on semi-European principles; that is, Chinese in service and filth, and European in diet. Though the Cantonese have been represented as being of all Chinese the most hostile to strangers, yet it has been the experience of intelligent travellers that a courteous and cheerful deportment has always secured immunity from insult in visiting portions of the city distant from the foreign quarter; and even rambles with ladies in company have been extended without molestation through the country, around the fortifications of the walled city proper. Goods are carried by coolies by means of a pole stretched across the shoulders of two or more. The narrow streets being impassable for carriages, the only vehicles are sedan chairs, carried likewise by coolies. These are found in immense numbers, and offer their services at very low rates. The city is divided into quarters for the accommodation of divers kinds of business, almost every trade or occupation having its own separate quarter. The proprietors of the various shops are noted for their suavity. When not engaged within, they are seen standing in the doorways of their establishments, and, in an amusing jumble of mongrel English and Portuguese, most pertinaciously solicit the attention of the passing foreigner. The Cantonese shopkeeper extends a liberal hospitality to his customers; he generally has a refreshing cup of tea to present, or wine and other refreshments; and if his civili-



New China Street.

rats, and geese are the staple ingredients. About 4 m. from the city is anchored the "boat town," or the 40,000 covered river boats, which are the constant homes of 300,000 people called Tankia, a strange, amphibious, pariah race, who subsist by fishing, carrying goods and passengers, and various singular occupations, such as the rearing of ducks, pup-

ties fail to secure a purchaser, he parts with his visitor with the same politeness with which he received him. Provisions of all kinds are abundant and cheap in Canton; and few large cities can compare with it in point of salubrity. Canton sends forth annually about 10,000 trading adventurers and laboring coolies to different parts of Asia, and of the latter lately to Australia, California, South America, and the West Indies. The temperature ranges from 75° to 90° F. between June and August, and 50° to 30° in January and February. Most of the rain falls in May and June, but in much less quantity than during a rainy season in the same latitude on the Indian peninsula. The S. W. monsoon causes a clear sky, and brings a refreshing and invigorating air from October to January. A good deal of unhealthiness is complained of in the foreign quarter, especially among the women; but this must be attributed to their luxurious and heavy European diet, and to the entire absence of suitable exercise.—There is no local police, but the city is divided into numerous districts or compartments with gates, which are closed at night as well as the city gates. Each community within these compartments is held responsible to the authorities for peace and order; but a police force is kept on the river. Thus the Cantonese seldom or never go out visiting or to places of public amusement in the evening, but spend their leisure time at home. There are numerous public buildings, such as pavilions, halls, and religious edifices, few of which deserve special notice, though some are not destitute of elegance. There are also a large number of temples, mostly dens of vice, in which there are about 3,000 priests and nuns. Two pagodas are conspicuous. One, called the Kwang-tah (plain pagoda), about 1,000 years old, rises in an angular tapering tower to a height of 160 ft.; the other, about 1,300 years old, is an octagonal nine-storied edifice, 170 ft. high. There are several prisons, the largest of which is capable of containing 1,000 prisoners, and a foundling hospital, the children from which when grown up are sold, often for the worst purposes. The temple of the 500 gods, or "flowery forest," is remarkable for the great number of colossal wooden figures of all colors, with grotesque or hideous faces, arranged in close order round the walls of the saloon, which are the guardian genii of China. The hall of worship is 60 ft. square, with a lofty ceiling. In the centre is a gigantic triple-carved statue, in a sitting posture, representing Buddha. Another temple, dedicated to longevity, contains a colossal idol of wood representing an obese old man. Here is kept a family of storks which are daily fed by the attendants. The examination hall contains about 9,000 stalls, where sit students and candidates for government offices, to pass their examination.—The number of foreign residents in Canton is estimated at 130, mostly English and American. In 1846 there were 357 foreign residents, ex-

clusive of the families belonging to several of them. Up to 1856 the foreigners resided at the factories, chiefly built by the East India company, which on the bombardment and capture of Canton at the end of that year were burned and levelled by the Chinese; and after the proclamation of peace the merchants had to rent native tenements on the Ho-nan side, while the consular and other authorities were scattered over the city and western suburbs. The English obtained from the Chinese authorities a concession of the destroyed Shameen forts, situated in a salubrious part of the western suburbs on the river bank. The area allowed for foreign settlement has an extent of 24 acres. On the river side it is protected by a granite wall, and there is sufficient depth of water for a vessel of 1,000 tons burden to lie alongside. On the land side it is separated from the Chinese dwellings by a canal with stone embankments, across which there are three stone bridges. Good roads have been constructed along the margin of the concession, and that part facing the river is planted with trees and shrubs, forming a pleasant promenade. Streets were laid out and houses built, and the residents have formed themselves into a committee for municipal purposes. There are 30 or 40 large factories or hong, an Episcopal church built of white marble, a club house, and a good library. Some of the American houses, finding that the acquisition of title by Americans within the British concession was attended with uncertainty, have rebuilt their old factories.—Industry is active at Canton. The weaving of silks and other stuffs, and the manufacture of porcelain, fancy tables, screens, umbrellas, children's toys, jewelry in the precious metals, ivory, cranes' beaks, and other materials, ivory fans, &c., employ thousands of hands; and the products are sold at the lowest prices. The number of weavers is estimated at 50,000, including the embroiderers, the barbers at 7,000, and the shoemakers at 4,000. The printing and book trade is also considerable. There are no large manufacturing establishments, the craftsmen working either singly at home or in small companies. Each trade or calling is united into guilds for mutual protection and support. Canton is the chief entrepot of the commerce of China with Japan, Siam, Cochin China, and the islands of the Malay archipelago. The great junk fleet at Canton, composed of vessels ranging from 500 to 1,000 tons burden, contributes more to the wealth of the city than the European fleets which anchor at Whampoa. There are several millionaire Canton merchants at Batavia, Singapore, and Bangkok. When we regard the position of Canton, we find that, though more remote from the sea than its northern commercial rivals, Shanghai, Ningpo, Foo-choo, and others, it is very favorably situated to take advantage of the monsoons that waft its junks to the ports of S. E. Asia. Its position for internal trade is also

highly favorable. The river Pe, or North stream, and the Yuh, or Western stream, with their confluents, which have deep waters and a gentle current, are navigable throughout the whole extent of the rich provinces of Quang-see and Quang-tung. The products of the rich valley bounded by the Mei-ling, Yung-ling, Ya-shan, and Lo-feu-shan ranges of mountains, with an area of 150,000 sq. m. and a population of 60,000,000, have no other market but Canton. Before the establishment of Shanghai as a port of foreign entry, the products of the Yang-tse valley and the populous Poyang lake basin were brought down the Kan river to Nan-ngan; thence by portage through a pass in the Mey-ling mountains, 24 m., to Nan-hiung, a considerable town at the head of navigation of the Pe, and thence down to Canton. The natural waterways of the rich valley which forms the background of Canton are tapped at innumerable points by artificial conduits, forming a network of irrigation and water communication, far surpassing anything of similar character in any other country. The aspect of the landscape, beheld from the fortifications in the rear of the city, is exceedingly picturesque. Far away among the beautiful verdure and shrubbery of the plain you behold the gilded masts of junks gliding in all directions, intermingled with the pointed roofs of villages and the spires of pagodas. This beauty of distant Chinese scenery does not appear in the approach to Canton, and the traveller who for the first time passes through the great delta or archipelago below the city, is disappointed by the aspect of the sluggish stream, the low mud banks, and the dead treeless level lying beyond. Formerly the whole of the foreign trade was carried on by sailing ships, but since the establishment of the colony of Hong Kong there has sprung up a line of river steamboats, chiefly of American build, which ply daily between Canton, Macao, and Hong Kong, and convey the greater part of the produce and merchandise for foreign and native consumption, as well as passengers. The mouth of the river, or rather the gulf of Canton, unlike other Asiatic rivers, is not blocked by sand banks, and the channels separating the islands present no serious danger to shipping; but in consequence of the strong eddies and intricate navigation in the estuary and inner waters of the Canton river, it is necessary to take a pilot as far as the Boca Tigris, whence another pilot conducts to the anchorage at Whampoa, 12 miles from the city. From the rise of the tide and the nature of the ground it has been found advantageous to construct several docks for repairing ships. From these facilities a number of vessels enter which have no traffic at this port, so that the shipping returns are in excess of the commercial tonnage.—According to Chinese authorities, Canton has existed as a city for 40 centuries, and was originally called Nan-keao. Whether those accounts are correct or not, traces are found of Nan-wo-ching

(the martial city of the south) 1,200 years before our era. Its name was changed several times, and its population and importance rapidly increased. Commercial relations were formed with the merchants of India, and toward the 8th century it had an extensive trade. At the end of the 9th century it was besieged by the Cochinchinese. Canton distinguished itself, about 1650, by an obstinate resistance to the Manchoo Tartars, who then established the dynasty which now rules China, which was followed by a fearful massacre after its capture. Chinese writers estimate the number of those killed during the siege and subsequent massacre at 700,000. In 1839 a fire destroyed about 10,000 houses. The first intercourse of Europeans with this city was in 1517, when Emanuel of Portugal sent eight ships of war to accompany an ambassador, who went to Peking and obtained permission for his government to establish a trading post near Canton, which was ultimately fixed at Macao. In 1596 the English failed in an attempt to open trade there. In 1684 they made another attempt with a greater number of ships; but the expedition was abortive through the machinations of the Portuguese. In 1680 an English factory was established at Canton. The perseverance of the English finally gained for them a superior position in the European trade with Canton, which they still maintain. Their imports in 1842, before the opening of other ports to foreign trade, were about \$17,500,000 of British manufactures, and \$13,000,000 of colonial produce; with exports valued at \$19,000,000, of which \$15,000,000 was of tea. The United States rank next to Great Britain in commercial importance at Canton. The enterprising merchants of Salem were pioneers of this trade, commenced at great risk amid the dangers and vicissitudes of the war of the revolution. Raw silk has become the most important article of export from the province of Canton to the United States. In the summer of 1871 the value of raw floss and woven silks shipped from the port of Canton to this country amounted to \$1,222,911. The value of the other exports to this country, as tea, drugs, cassia, lacquered ware, and other Chinese manufactures, amounted to \$1,178,599. The total quantity of silk exported in 1871 from Canton was 2,153,300 lbs. Up to 1850 Canton was the chief foreign emporium in China, when it began to be surpassed by Shanghai.—On May 26, 1841, the British, failing to obtain redress for certain grievances, captured the forts which command the city, and compelled it to pay a ransom of £6,000,000 to save it from bombardment; and by the treaty of Nanking on Aug. 26 of the following year it was opened to English commerce. In 1847 the British again took possession of the outer fortifications of Canton. Again, in combination with the French, they commenced hostilities in October, 1856, against the city, which they captured without much

loss, Dec. 29, 1857. The place was occupied as a material guarantee for the payment of an indemnity of £666,000 in equal proportions to the English and French. It was evacuated by the allies on Oct. 21, 1861, and possession handed over to the viceroy of the province. Since this last capture by the allies, the opening of other ports for foreign trade has diminished the relative importance of Canton. Its import trade has also suffered from the levy of additional imposts to defray the expenses caused the government by the Taeping rebellion. The Canton merchants are getting more and more of the trade into their hands, going to Hong Kong to purchase, and carrying the goods to the various ports in native junks. In consequence there has been a great falling off in cotton and woollen manufactures, and also in opium, the value of which in 1866 was \$1,322,866, against \$2,290,234 in 1868.

CANTON, John, an English savant, born at Stroud, Gloucestershire, July 31, 1718, died March, 22, 1772. In March, 1737, he went to London, where he engaged as an assistant in the school in Spital square, and after a few years succeeded to the mastership. In 1745 the discovery of the Leyden vial turned his attention to the subject of electricity, in which he made several valuable discoveries, almost simultaneously with Franklin. He was the first in England to verify Franklin's hypothesis of the identity of dynamic electricity and lightning (July, 1752). In March, 1750, he submitted a paper to the royal society on the method devised by himself of constructing artificial magnets, which procured him an election to a membership of the society, and an award of a gold medal. Papers on the possible elevation of rockets, the phenomena of shooting stars, the electrical properties of the tourmaline, the variation of the needle, with appended observations for one year, and the compressibility of water with details of experiments, followed each other in quick succession from 1753 to 1762, and brought him in 1765 a second medal from the royal society. The last paper which he submitted to the society was to prove that the luminousness of the sea arises from the putrefaction of its animal substances. His papers are in the "Philosophical Transactions," and in accounts of new experiments in Priestley's histories of electrical and optical discoveries.

CANTON RIVER (Chinese, *Choo-kiang*, or Pearl river), the lower part of the Pe-kiang, a river of China flowing through the province of Quang-tung. Opposite the city of Canton, and for some distance below, it is filled with small islands, planted with rice, and defended by a number of forts. It is here crowded with shipping, and deep enough to admit vessels of 1,000 tons burden. The ships of foreign nations, however, discharge and receive their cargoes at Whampoa, a place 12 m. lower. At a point about 40 m. below Canton the river expands into an estuary 20 m. wide, and takes the name of Boca Tigris.

CANTÙ, or **Canturio**, a town of N. Italy, in the province and 5 m. S. E. of Como, situated in a beautiful region on the Brianza; pop. of the commune about 7,000. It is walled and entered by six gates. The fine bell tower of the parish church, with its projecting battlements, was used as a beacon in the middle ages, and then corresponded with that upon the neighboring Mt. Baradello. In the vicinity are some iron works.

CANTÙ, Cesare, an Italian historian, poet, and philosopher, born in Brivio, Sept. 5, 1805. He was educated at Sondrio, where he taught belles-lettres, resided afterward in Como, and next at Milan till 1848. One of his earliest works, entitled *Ragionamenti sulla storia lombarda del secolo XVII.* (21st ed., 1864), brought upon the author the animadversion of the Austrian government, which condemned him to a year's imprisonment. During his confinement he composed a historical romance, *Margherita Pusterla* (Florence, 1845; 36th ed., 1864). His great work, *Storia universale*, appeared first in 1837, at Turin. It was revised and reprinted at Palermo and Naples (9th ed., 35 vols., Turin, 1864), and translated into German and French. The work consists of the narrative, followed by volumes of documentary history and various illustrative essays by the author, and concludes with tables and appendices giving a résumé of the whole work. Cantù possesses a critical spirit, and in his judgments on literary and political characters he seeks to be just as well as independent. He is a friend of liberty, and has suffered in its cause; yet he is a devoted admirer and practical follower of the doctrines of the Roman Catholic church. All these traits combine to give a peculiar character to his history, and render it both interesting and important. His religious lyrics are found in all popular collections of that kind of poetry, and are much esteemed by his countrymen. Among his other works are: *Storia di Como* (2 vols., Como, 1829); *Parnasso italiano: Poeti italiani contemporanei, maggiori e minori* (Paris, 1843); *Algiso, o la Lega lombarda* (Milan, 1846); *Letture giovanili* (4 vols., published about the same time), devoted to popular education; *Storia degli Italiani* (6 vols., Turin, 1854); *Storia della letteratura latina* (1863); *Storia della letteratura greca* (1863); *Storia della letteratura italiana* (Florence, 1864); *Il tempo de' Francesi* (Naples, 1864); *Gli eretici d'Italia* (3 vols., Turin, 1866); *Buon senso*; and *Porto-foglio d'un operaio* (Milan, 1867). Cantù was obliged to leave Milan at the time of the insurrection of 1848, but subsequently returned, and devoted himself to historical and philosophical studies. In 1869 he was elected a corresponding member of the French academy of moral sciences.

CANUTE, or **Knut**, the Great, the second king of Denmark of that name, and first Danish king of England, born in Denmark about 995, died at Shaftesbury in 1035. He was the son of King Sweyn, whom he accompanied in his

victorious campaigns in England. Sweyn, having proclaimed himself king of England, died in 1014, before his power was established, and appointed Canute his successor there. The latter was immediately driven out by Ethelred, the representative of the Saxon line, and fled with 60 ships to the court of his brother Harold, king of Denmark. Harold enabled him to collect a large fleet, and he invaded England anew in 1015. He fought several battles with Edmund Ironside, and was finally victorious at Assington. After this battle they agreed upon a division of the kingdom. To Canute were assigned Mercia and Northumbria, while Edmund preserved West and East Anglia. By the death of his brother Harold he obtained the crown of Denmark in 1016. In the same year, and but one month after the ratification of the treaty of partition, Edmund was assassinated by Eadric, Canute's brother-in-law, and Canute became sole king of England without further resistance. He put to death or banished several persons who might claim succession to the throne, and sent Edmund's children to Olaf, king of Sweden. He put away his wife, Alfgiva, the daughter of the earl of Northampton, and espoused Emma, the widow of Ethelred the Saxon monarch (1017), on the condition that their children should succeed to the throne of England. He made every effort to gain the affections of his English subjects, and disbanded his Danish army, retaining only a body guard. He endeavored to blend the two races, and, to induce them to live in harmony, erected churches, and made donations to abbeys and monasteries on the scenes of former conflicts and massacres. He compiled a code of laws, still extant, in which he denounced those who kept up the practice of pagan rites and superstitions, and forbade the sending of Christian slaves out of the country for sale. Although Canute generally resided in England, he made frequent visits to Denmark, carrying with him English missionaries and artisans, and promoted Englishmen to the newly erected bishoprics of Scania, Seeland, and Funen. In 1025 he was attacked by the king of Sweden and defeated; but in the night Earl Godwin, at the head of the English contingent, surprised the Swedish camp and dispersed the enemy. His absence from Denmark, and the bestowal of so many dignities there upon his English subjects, made him unpopular in that kingdom. To appease this discontent, in 1026 he left behind in Denmark his son Hardicanute, then aged 10 years, under the guardianship of his brother-in-law Ulf. In this year he made a pilgrimage to Rome, where he was well received by Pope John XIX. and by the emperor Conrad II., who gave up to him all the country N. of the river Eider. From the pope he obtained privileges for the English

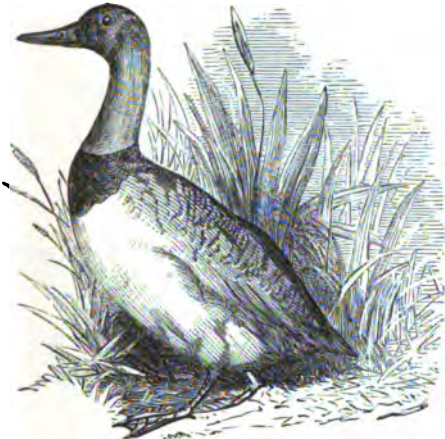


Coin of Canute.

school established in Rome, and an abatement of the sums demanded from his archbishops for the pallium; and from the various princes, relief for all English and Danish pilgrims and merchants from all illegal tolls and detentions which they had endured on their route to Rome. He returned from Rome to Denmark, and in 1028 made an expedition into Norway, expelled Olaf, and restored Haco, who swore allegiance to him. In 1029 he returned to England, and his Danish subjects proclaimed Hardicanute king of Denmark. Canute immediately returned thither, put down the revolt, and executed Ulf. In 1031 Canute was acknowledged king of Norway, and laid claims to the crown of Sweden. On returning again to England, he allowed his son Hardicanute to share with him the Danish crown. Canute's reign is very important in the constitutional history of Denmark. He issued the first national coinage of that kingdom, and published the first written code of Danish law, wherein the custom of private vengeance was prohibited. He raised the clergy to a separate estate of the realm, and instituted a royal guard of 3,000 men. The members of this body were all men of good family, and rich enough to equip themselves at their own expense. From them sprang the Danish order of nobility; they were tried only by their peers, and formed with the king the highest court of justice. He was buried at Winchester. By Emma he had two children, namely, Hardicanute, or Canute the Hardy, and a daughter, Gunhilda, married to Henry, the son of Conrad II. of Germany. By Alfgiva he left two sons, Sweyn and Harold. To Sweyn was given the crown of Norway; Hardicanute retained that of Denmark; and Harold, surnamed Harefoot, took possession of that of England. Canute is most popularly known by the familiar story of the monarch, the courtiers, and the disobedient tide.

CANVAS-BACK (*aythya Vallisneria*), a duck of the family *fuligulina*, or sea ducks, peculiar to North America, and celebrated as the most delicious of all water fowl. The sea and its bays and estuaries are the principal haunts of this genus. Sir John Richardson states that the *A. Vallisneria*, the canvas-back, *A. Americana*, the red-head, and *fulix collaris*, the ring-neck, breed in all parts of the fur countries, from the 50th parallel to their most northern limits, and associate much on the water with the *anatina* or river ducks. The male canvas-back has the region of the bill, the top of the head, chin, base of the neck, and adjoining parts dusky red; sides of the head and whole length of the neck deep chestnut red; lower neck, fore part of breast and back, pitch black; the rest of the back white, closely marked with fine undulating lines of black; rump and upper tail coverts blackish; wing coverts gray, speckled with blackish; primaries and secondaries light slate color. Tail short, the feathers pointed; lower part of the breast and abdomen white; flanks the same

color, finely pencilled with dusky; lower tail coverts blackish brown, intertwined with white. Length 22 inches, wing 9½ inches. The bill is bluish black; the feet and legs are



Canvas-Back Duck (*Aythya Vallisneria*).

dark slate color, the irides fiery red. The female is somewhat smaller, and is less brilliantly and less distinctly colored than the male. The canvas-back duck returns from its breeding places at the north about the first of November, and during the winter extends its visits to the southern parts of the seacoast of the United States. It is not unfrequently shot in the eastern part of the Great South bay of Long Island, in Long Island sound, on the shores and bays of New Jersey, and in the estuary of the Delaware; but in these localities it is but a common duck, nowise superior to many others, and decidedly inferior to the red-head. It is only in the Chesapeake bay, about the mouths of the Potomac river and Gunpowder creek, that it becomes superior to all other wild fowl. This excellence is attributable solely to the peculiar food which it finds in that estuary, a plant commonly known as wild celery, botanically as the *zostera Vallisneria*, or *Vallisneria Americana*, which must not be confounded with the *zostera marina*, or common eel grass. This plant, of which the canvas-back duck is so fond that it derives from it its specific name of *Vallisneria*, grows on shoals, where the water is from 8 to 9 ft. in depth, which are never wholly bare. It has long, narrow, grass-like blades, and a white root somewhat resembling small celery, whence it has its vulgar name, though it has no connection whatever with that plant. This grass is in some places so thick as materially to impede a boat when rowed through it. It is on the root alone that the canvas-back feeds. For these roots the canvas-backs dive assiduously and continually, tearing up the grass, and strewing it on the surface of the water in long, regular rows. The duck rises to the sur-

face as soon as he has obtained his favorite root, which he cannot swallow under water; and, before he has got his eyes well open, says Wilson, is often robbed of his meal by the widgeons or bald-pates (*mareca Americana*), which never dive, but, being equally fond of the root of the *Vallisneria*, depend on their adroitness and agility to rob the industrious canvas-backs. On this account the bald-pates congregate eagerly, as far as they are allowed to do so, with the canvas-backs; who, however, live in a constant state of contention with their thievish neighbors, and, being by far the heavier and more powerful fowl, easily beat off the widgeons, who are compelled to retreat, and make their approaches only by stealth at convenient opportunities. With the canvas-backs also associate the red-heads, the scaups, or, as they are called in the Chesapeake, the black-heads, and some other varieties, with which they feed on terms of amity. —The excellence of the flesh of the canvas-backs causes them to be much sought after for the market, but in the waters which they frequent they are so strictly preserved by the real sportsmen, who abound in that part of the country, and have obtained the control of most of the shores, that the worst methods of poaching are prohibited. The canvas-backs will not fly, like geese and many species of ducks, to decoys; and the anchoring of batteries on the feeding flats, and the sailing after the birds on their grounds with boats, are not permitted under any circumstances, which has preserved thus far this delicious fowl from extermination. The ordinary mode of killing them is by shooting them on the wing, from behind screens, or blinds, as they are termed, of reeds, arranged on the projecting points of land, over or in the vicinity of which the fowl are compelled to fly in going up and coming down the bay, to and from their feeding grounds. The velocity at which they fly, as well as the height of their course, renders it extremely hard to hit them; and a great allowance must be made in taking aim, in order not to shoot far behind the object, which will surely be the case if the sight of the gun be directly laid on the passing fowl. Add to this, that the feathers on the breast of this duck, as of many others of the family, are so closely compacted together, of so thick and elastic texture, and so matted by the aid of the oil from the gland in the rump with which the bird lubricates them, that any ordinary shot, striking on the breast as the fowl comes toward the shooter, will make no impression. The best and most deliberate fowlers, therefore, when they have time to do so, let the flights pass, and then shoot them with the grain of the feathers. A remarkable propensity of these birds is to be attracted by the appearance of any unusual sight on the shores; and anything of this nature will induce them to leave their feeding grounds, and swim in great flocks of thousands together, perfectly fearless, or rather reckless, to the places where men lie

in ambush for them. It is said that the scap or black-head can be allured in this manner more easily than the canvas-back; and that the red-heads and widgeons, when they are alone, cannot be deceived at all, though when in company with others they will fall into the same error, and accompany the flocks to their own destruction. Advantage has been taken of this habit to ensnare the unwary birds by a system which is called toling. It is thus practised: A long range of screens is set up along the shore, within a few yards of the water mark, behind which the shooters lie concealed, with small openings at intervals to permit the egress and ingress of a small cur-dog, the more like a fox the better, as also the odder his appearance and the more remarkable his color, who is taught to run back and forward in front of the blinds, performing all sorts of curious tricks and antics, to attract the attention of the fowl. So soon as this object is attained, they will swim up in a body within easy gunshot; and so totally are they demented by their curiosity, that so long as the shooter holds himself concealed, and the dog continues his deceptive gambols, so long can the stupid birds be drawn up, to receive volley after volley, until they are decimated or destroyed, perfectly regardless of their dead or wounded companions, through which they will continue to advance to the muzzles of the guns. The only thing necessary to be observed in this sort of shooting is not to overshoot the flock, which a novice is sure to do, so deceptive is the effect of shooting over water. The plan adopted by the oldest shooters is, in taking aim, to see the whole body of the nearest fowl, in a flock of hundreds, in clear relief above the sight of the gun, and then the charge will fall into the middle of the throng. By good sportsmen, toling, and indeed any other way of shooting canvas-backs than on the wing, from points, is held to be rank poaching. When the rivers begin to freeze, vast numbers of all these varieties of ducks congregate at the open air holes, and fearful slaughter is made of them in hard weather at such places; as many, it is said, as 88 canvas-backs having been killed at a single discharge of a heavy gun. Wounded canvas-backs are expert divers, and are extremely difficult to recover; wherefore it is usual to be accompanied by a good Newfoundland retriever.

CAOUTCHOUC, or **India Rubber** (called by the South American Indians *cahuchu*), the inspissated milky juice of a number of trees and plants found in Mexico and Central America, in Brazil, Guiana, Peru, and in the East Indies. The Mexican tree is the *castilleja elastica*, a genus belonging to the order *artocarpacea*. The South American tree has been variously named by different naturalists. It is the *jatropha elastica* of Linnæus, the *siphonia elastica* of Persoon, the *siphonia cahuchu* of Scherber and Willdenow, and the *hevea Guianensis* of Aublet, and belongs to the order *euphorbiacea*.

The trees which furnish the greater part of the caoutchouc brought from the East Indies are the *ficus elastica* of Assam, of the order *moraceæ*, and the *urceola elastica* of Sumatra and



FIG. 1.—*Ficus elastica*.

other islands of the eastern archipelago, which belongs to the order *apocynacea*. The *ficus elastica* is one of the noblest of trees, and beyond the Ganges are found inexhaustible forests of it. Several years ago William Griffith, an Englishman, published a report upon this caoutchouc tree of Assam at the request of Capt. Jenkins, the agent of the governor general of India, in which he says the tree is either solitary, or in two- or three-fold groups; is large and umbrageous, and may be distinguished from other trees at a distance of several miles by the picturesque appearance of its dense and lofty crown. The main trunk of one measured 74 ft. in circumference, and the area covered by its expanded branches had a circumference of 610 ft. The height of the central tree was 100 ft. It has been estimated that there are over 48,000 such trees in the district of Chardwar, in an area 80 m. in length by 8 in width. It grows on the slopes of the mountains from the valleys up to an elevation of 22,000 ft. Its geographical range in Assam appears to be between lat. 25° and 27° N., and between about lon. 90° and 95° E. It is allied to the banian (*ficus Indica*). The *urceola elastica*, a twig of which in blossom, with some of the fruit, is represented in fig. 2, is a large climbing tree, with a trunk frequently as thick as a man's body. It has sharp, ovate-oblong, opposite leaves, with a rough upper and hairy under surface, and bears many-flowered terminal cymes of small greenish blossoms, which produce double fruits, consisting of two large, roundish, apricot-colored, rough, leathery-skinned pieces, about the size of oranges, containing numerous kidney-shaped seeds in a copious tawny-colored pulp, which is much

relished both by natives and European residents. The flowers have a five-cleft calyx; a pitcher-shaped hairy corolla, with five short, erect teeth; five stamens, rising from the base



FIG. 2.—*Urceola elastica*.

of the corolla, and having very short filaments and arrowhead-shaped anthers. The *castilloa elastica*, the Mexican tree, grows from 50 to 100 ft. high and from 8 to 20 in. in diameter. It has male and female flowers alternating on the same branch. The male flowers have several stamens inserted into a hemispherical perianth, consisting of several united scales. The female flowers consist of numerous ovaries in a similar cup. The South American tree, the *siphonia elastica*, varies from 25 to upward



FIG. 3.—*Siphonia elastica*.

of 100 ft. in height. The leaves consist of three entire leaflets radiating from the top of a long stalk, and are clustered toward the ends of the branches. The flowers are borne in loosely branched panicles, with numerous little branchlets consisting of a few male flowers and a female at the top. Both sexes have a bell-

shaped five-toothed calyx, and no corolla. The fruit is a large capsule composed of three one-seeded pieces, which split in leaves when ripe. The raw seeds are poisonous to man and quadrupeds, but macaws eat them, and they are used as a bait for fish. Long boiling deprives them of their poison.—The province of Pará, south of the equator, in Brazil, furnishes to commerce immense quantities of caoutchouc. The tree is tapped in the morning, and during the day a gill of fluid is received in a clay cup placed at each incision in the trunk. This when full is turned into a jar, and is ready at once to be poured over any pattern of clay, or a wooden last covered with clay, the form of which it takes as successive layers are thus applied. Its drying and hardening are hastened by exposure to the smoke and heat of a fire, and thus the substance acquires its ordinary black color. Dried by the sun alone, it is white within and yellowish brown without; when pure, it is nearly colorless. Complete drying requires several days' exposure to the sun; during this time the substance is soft enough to receive impressions from a stick, and is thus ornamented with various designs. The natives collect it upon balls of clay in the forms of bottles and various fanciful figures, in which shapes it is often exported. They also make it into tubes, which they use for torches. The clay mould over which the bottles are formed, being broken up, is extracted through the open neck. From the custom among the natives of presenting their guests with one of these bottles furnished with a hollow stem, to be used as a syringe after meals for squirting water into the mouth, the Portuguese gave the name of *seringat*, or syringe, to the gum and also to the tree which produces it. The moulded articles are brought into Pará suspended on poles to keep them from touching each other, as for a long time they continue sticky. It is not only prepared in various moulded forms, as bottles, toys representing animals, rudely shaped shoes, and in flat cakes also for exportation, but a method has been devised for preserving the juice as it comes from the tree, and shipping this in air-tight vessels of tin or glass. The liquor is first filtered and mixed and well shaken with about $\frac{1}{8}$ of its weight of strong ammonia. On being poured out upon any smooth surface, and exposed to a temperature of 70° to 100° F., the ammonia, which preserved it from the action of the oxygen of the atmosphere, evaporates, and leaves the gum in the form of the object which holds it. It has in this state a pure white appearance. The juice is of a pale yellow, of the thickness of cream, of a sourish odor, and of specific gravity 1.012. The pure caoutchouc which separates from it, rising like coagulated albumen to the surface, as the mixture of the juice with water is heated, has the specific gravity of only 0.925. This, being skimmed off like cream as it forms, is found to constitute about 32 per cent. of the juice. It may also be precipitated by salt or

hydrochloric acid. On being pressed between folds of cloth and dried, it becomes transparent. It swells by long-continued exposure to boiling water, but regains its form after being removed some time. Alcohol does not dissolve it, but precipitates it from its solution in ether. It is slightly soluble in ether free from alcohol, more soluble in coal naphtha, oil of turpentine, and chloroform; but its best solvents are sulphide of carbon, and especially the liquid hydrocarbon, called caoutchoucine, obtained by distilling the crude caoutchouc. The weak acids and alkaline solutions have no effect upon it. On evaporating its solution, the substance is recovered in some instances elastic and dry as before, so as to serve the purposes of a varnish, which possesses the properties of the original juice; or it is obtained in an adhesive, inelastic state. At the temperature of about 248° F. it melts and remains in a sticky condition, unless long exposed to the air in thin layers. It readily inflames and burns with much smoke. Its elasticity is very remarkable; and when a piece of it is stretched, heat and electricity are evolved. If a piece is kept distended for two or three weeks, its elasticity is lost; exposure to temperature as low as 40° produces the same effect; but the application of a gentle heat immediately restores it. This property is taken advantage of in the manufacture of elastic textile fabrics, woven of the inelastic threads, which are afterward made elastic by heat. At 600° it is partially volatilized, and the vapor when condensed is the oily substance called caoutchoucine, which has been before mentioned as the best solvent of caoutchouc. According to experiments made many years ago at Utrecht, it yields at a red heat about 30,000 cubic feet of hydrocarbon gas to the ton, quite free, of course, from sulphur and ammonia compounds, and possessing illuminating properties much superior to those of the best oil gas; but its expensiveness prevents its being used in this way. According to the analysis of Prof. Faraday, the gum is a hydrocarbon consisting of 8 equivalents of carbon and 7 of hydrogen, which would require the proportion of 87.27 of carbon and 12.73 of hydrogen in 100 parts. The numbers found by him were respectively 87.2 and 12.8. The juice, as obtained from the tree, gave in 100 parts—

Water containing a little free acid.....	56.87
Caoutchouc.....	31.70
Albumen.....	1.90
Wax.....	trace.
A nitrogenized body soluble in water.....	7.18
A substance insoluble in water.....	2.90
	100.00

—Caoutchouc was long known before its most valuable qualities were appreciated. La Condamine was the first to give a particular description of the gum, which he did in a communication to the French academy of sciences in 1736. Again in 1751, after a residence of ten years in the valley of the Amazon, he brought the subject into notice,

and called attention to the memoir of M. Fresneau, who had found the tree in Cayenne. In 1761 MM. Hérissant and Macquer reported their chemical observations on caoutchouc to the royal academy; and in 1768 M. Grossait published his experiments for obtaining good tubes of India rubber by means of ether and boiling water. Dr. Priestley refers to it, in the preface of his work on "Perspective" (1770), as a substance which had just been brought to his notice, as admirably suited for rubbing out pencil marks, and as being then sold at the rate of 3s. sterling for a cubical bit of about half an inch. In 1797 a patent was obtained in England by a Mr. Johnson for rendering cloth water-proof by covering one side with a varnish made of India rubber dissolved in equal parts of oil of turpentine and spirits of wine, and sifting over the surface silk, wool, flock, and other substances; and in 1813 a patent was issued in the United States to Jacob F. Hummel of Philadelphia for a varnish of gum elastic. In 1819 Mr. Mackintosh, who was engaged in the manufacture of cudbear, made an arrangement with the Glasgow gas works to receive their tar and ammoniacal products. It occurred to him that the oil of naphtha obtained from these might be useful as a solvent for India rubber, and in 1823 he obtained a patent for the manufacture of water-proof fabrics, since widely known as "mackintoshes." He established a manufactory at Glasgow, and subsequently, with others, went into the business on a large scale at Manchester. Mr. T. Hancock, who became associated with him, had already in 1820 obtained a patent "for an improvement in the application of a certain material to various articles of dress, and other articles, that the same may be rendered elastic." In 1825 Thomas C. Wales, a merchant of Boston, introduced the original Pará overshoe in its rough state as made by the Indians of Brazil, and soon caused an improvement in its shape by sending the native shoemakers American lasts. In 1828 nearly half a million India-rubber overshoes were exported from Brazil to Europe and the United States. In 1832 Wait Webster of New York received a patent for attaching soles to gum elastic boots and shoes, and the next year similar patents were granted to Nathaniel Ruggles of Bridgeport, Conn., and to Samuel D. Breed of Philadelphia. In 1833 boots were exhibited at the fair of the American institute by J. M. Hood of New York, which had been made here and sent to South America to be varnished with the fresh juice of the caoutchouc tree. In 1826 and 1827 Messrs. Rattier and Guibal, proprietors of a factory at Saint-Denis near Paris, employed machinery for cutting filaments of India rubber, of which they made fabrics. Subsequently machines for this purpose were patented in England by Westhead of Manchester, Mr. Nickels, and others, which cut threads from a flattened disk of rubber varying in fineness from 700 to 5,000 yards

to the pound. In April, 1831, George H. Richards of Washington, D. C., received a patent for a fluid caoutchouc; and soon afterward Edwin M. Chaffee of Roxbury, Mass., and others established the Roxbury India-rubber company, which was chartered in 1833, and was the first company organized in the United States to manufacture caoutchouc into water-proof clothing. They made shoes, coats, life-preservers, and carriage traces, covering them with caoutchouc dissolved in some essential oil, spirits of turpentine being principally used. Considerable excitement grew out of this enterprise, and shares in the company's stock, which at first sold for \$100, went up to \$300 and \$400. Active competition soon sprung up, and during that year six companies were chartered in Massachusetts for making India-rubber goods; and these were soon followed by others in Troy, Providence, and elsewhere. In 1834 Mr. Chaffee obtained a patent for manufacturing India-rubber hose, and another for making boots and shoes. In the same year Dr. Alexander Jones of Mobile, Ala., produced a kind of carpet by means of India-rubber varnish applied to canvas which had been covered with wall paper. In September, 1835, Charles Goodyear, after devoting much time to experiments, took out his first patent, which was for an India-rubber cement. In the following year he used nitric acid to deprive the surface of India rubber of its adhesiveness, enabling manufacturers to expose an India-rubber surface on their goods; and this improvement was used till the production of vulcanized rubber. In the summer of 1838 Mr. Goodyear became acquainted with Nathaniel Hayward, who had been employed as foreman of the Eagle company at Woburn, Mass., where he had made use of sulphur by impregnating the solvent with it, and it was from him that he received his first knowledge of the use of this material. Mr. Goodyear soon afterward occupied the factory at Woburn, and employed Mr. Hayward in manufacturing life-preservers and other articles, by the sulphurous acid gas and solarizing process; he purchased the sulphuring process of him and took out a patent for it as his assignee, Feb. 24, 1839. The sulphur process, however, would not have been of much value but for subsequent improvements made by Mr. Goodyear. The sulphur imparted an offensive odor, and did not prevent the rubber from hardening in cold weather. Continued experiments revealed to him the fact that the application of considerable heat would cause the sulphured article to become pliant in cold weather, to have its elasticity increased at all temperatures, and its offensive odor much diminished. The new product of vulcanized rubber was the result of these experiments, and a patent was obtained for it, June 15, 1844. This patent was reissued in 1849, extended in 1858, and again reissued in 1860. Mr. Nelson Goodyear's subsequent improvements, and the production of hard rubber or ebonite by him, have

left little room for further improvement in the vulcanization of caoutchouc. (See GOODYEAR.) Many of Mr. Goodyear's patents are for the mixing of white lead and other mineral substances with caoutchouc, partially dissolved in some essential oil, grinding them together, and subjecting them to heat; and many such substances are still used for the manufacture of various articles. But most of the physical properties for which vulcanized rubber is remarkable are obtained by a simple mixture of caoutchouc and sulphur, the latter being added in quantities varying from 5 to 50 per cent., the larger quantities of sulphur being used, with an increase of heat, for the production of hard rubber, or ebonite. With the use of a moderate quantity of sulphur and a degree of heat varying from 220° to 275° F., the compound is remarkable for possessing a much higher degree of elasticity than pure caoutchouc, and for retaining this at temperatures even below the freezing point of water; neither is this property lost by frequent stretching. It also bears a considerable degree of heat without change, depending on the amount of sulphur with which it has been combined, and the degree of heat to which it has been subjected during the process of manufacture. Its elasticity is so much increased by vulcanization, that the original article will scarcely bear a comparison. To test its power of enduring heavy blows, Mr. Brockedon subjected a piece of it an inch and a half thick and two inches square to one of Nasmyth's steam hammers of five tons' weight. When resting upon it, the caoutchouc was compressed to about half its thickness. The hammer was then lifted two feet and dropped upon it without injury. When dropped through a space of four feet the cake was torn, but its elasticity was not destroyed.—The method of vulcanization of caoutchouc has undergone important changes since its invention, both in the preparation of the crude material and in the process of adding the sulphur. At first the caoutchouc was cut up into small bits and shreds by knives placed on strong iron cylinders, revolving in hollow cylinders armed with teeth, after which it was immersed in melted sulphur and subjected to pressure; or it was partially dissolved in oil of turpentine and ground with sulphur and other materials; or in some cases dissolved in sulphide of carbon, and this process is still sometimes employed. The most approved method, however, and the one in general use in this country, is the following: The crude caoutchouc is placed in a large vat of water, which is kept boiling by the introduction of jets of steam. In a vat which will contain about three hogsheads, 200 or 300 lbs. of the crude material may be immersed. The clay and dirt are softened as well as the caoutchouc, which also slightly swells and increases in elasticity and pliability. A mass of it, say from 10 to 20 lbs., is then taken and thrown upon a pair of strong fluted cast-iron cylinders, between which it is masticated into

small pieces, and washed by streams of hot water which fall upon it from a perforated horizontal pipe. After being passed several times through this machine, it is taken to another, standing

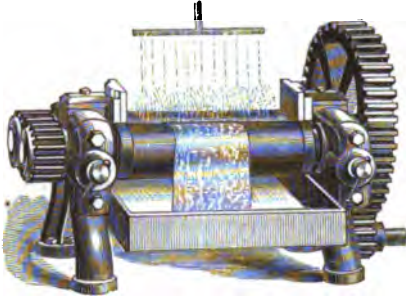


FIG. 4.—Washing and Compressing Mill.

beside it, similar in construction, but having a pair of smooth cylinders in place of the fluted ones. These produce an enormous pressure, which packs the pieces together in the form of a mat; this is also passed several times in succession through the machine and washed by the dripping of hot water, as in the preceding operation. These machines are called washing, masticating, and compressing machines. When the mat is sufficiently compacted and washed, it is taken to a drying room, a warm chamber heated by steam, where it is allowed to remain from four to six weeks, until it is thoroughly dry; for if it were attempted to work the material while it contained any moisture, an inferior fabric would be the result. When perfectly dry the rubber is taken to the mill room and passed successively through three mills. All the mills are of similar construction to the one already represented, except that in each machine one cylinder is made to revolve twice as rapidly as the other, in consequence of which the material is thoroughly ground and mixed. But while undergoing the process the continuity of the mat is not destroyed, for it retains its form, although a careful scrutiny will show that a constant and rapid change of position is going on among the particles. The cylinders are hollow and are supplied with steam, which keeps them at about 220° F. in the first mill, and at a little lower temperature in the other two. The first mill merely works and compresses the material into a firm thick sheet of a homogeneous texture, preparatory to the incorporation of the sulphur and whatever other ingredients are to be added, which operation is performed entirely in the second mill. Taking as an example the manufacture of India-rubber hose for steam fire engines, as carried on at a large establishment in New York, the subsequent steps are as follows: After leaving the first mill, about 5 per cent. of sulphur (and in some cases certain mineral matters, as white lead) is thrown upon the sheet while it is passing down between the cylinders. The mixing at first causes disintegration and the separation

of the material into shreds; but union is speedily reestablished, and the mass again becomes homogeneous, and will retain its pliability and elasticity after cooling. This, however, is not allowed to take place until it is passed through the third or finishing mill. Here the sheet is passed between the cylinders over and over again, until its pliability and working qualities are perfected, and as far as possible adapted to being spread upon canvas. This operation is performed in an adjoining room upon a calender (fig. 5), a machine somewhat similar to that used in cotton-bleaching establishments. The rubber is first of all again passed through a pair of cylinders in a machine called a feeder, which is also similar to the mills through which it has already passed. This feeder stands near the calender, and its purpose is to knead and temper the India rubber to the exact condition in which it can be best applied to the cloth. It is taken in handfuls at a time and fed to the calender between the two upper cylinders represented in the figure, but upon the opposite side to that which is shown. The surfaces of the two cylinders are so prepared that the rubber adheres in a thin sheet to the lower one of the two, which in its revolution brings it

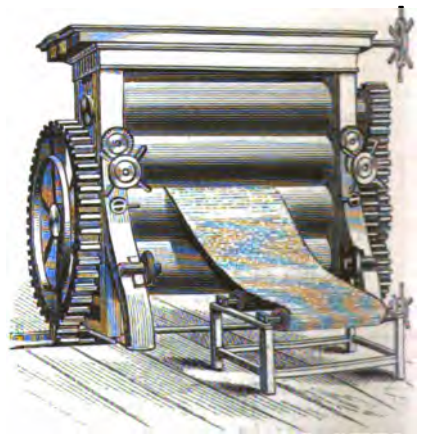


FIG. 5.—Calender.

in contact with the third or next lower cylinder, over which the cloth is being passed, forcing it thoroughly into the meshes of the fabric. After one side of the canvas has been coated it is turned, and the rubber is applied to the other side. It is then taken to a larger calender, where another coating is applied to one side, the whole sheet being well consolidated under powerful pressure. The cloth is now ready to be made into hose, and the operation is commenced by cutting it into strips diagonally, so that both warp and weft may receive the strain to which the hose may be subjected, thus greatly increasing the strength of the fabric. The strips are cut in width a little more than twice the intended circumference of the hose, so that one sheet will form two thicknesses of its walls.

The inner layer of the pipe is formed by a thick sheet of uncanvassed vulcanized rubber, which has been also prepared in one of the calenders. This is cut of the proper width, and wound round a long iron pipe used as a mandrel, and its edges are lapped over one another, firmly pressed together, and permanently joined by a small grooved roller held in the hand of the workman. Before being applied, the inner surface of this sheet of rubber must be coated over with a powder of some substance which will prevent adhesion to the mandrel, so that it may be removed after the hose is finished. The best substance is soapstone, or steatite. The lapping edge must be carefully left untouched with this material, or perfect union will not be possible. Around this inner coating are now successively wrapped two strips of the bias-cut rubber canvas, and over this another and outer coat of pure vulcanized rubber, making six coats in all, four of which are of rubber canvas. It is claimed that hose of two inches calibre, made in this manner, is capable of resisting a hydrostatic pressure of 400 lbs. per square inch at a temperature of 60° F. Each length of hose is usually made 50 ft. long, which has been found the most convenient for use on the hose carriages, the lengths being joined as required by couplings. After every layer has been wound over its concentric fellow, and also during the process, the workmen make use of their rollers to compress and consolidate the hose. After all the layers have been applied, the pipe is taken to another bench, where it is covered with four or five layers of cotton cloth, and then, with several others, it is placed upon a long carriage which runs upon rails into a large hollow cylinder

with the sulphur takes place, accompanied with the disengagement of sulphuretted hydrogen gas. This is one of the most important parts of the process of manufacture, and upon it, as well as upon the mixing of the ingredients, depend the strength and elasticity of the product. The heat should be raised gradually and maintained at a determined point till the vulcanization is completed, and then should be immediately withdrawn. In manufacturing engine hose, the New York gutta percha and rubber manufacturing company mix a certain amount of carboic acid with the caoutchouc, which it is claimed preserves the hose and shortens the process of vulcanization. An ingenious register is in use at their factory, the invention of Mr. John Murphy, by which the application of a steam pressure gauge to clockwork records the different degrees of temperature, and their duration, which may have been reached during the vulcanizing process, which is generally performed during the night, under the care of one or two men. When caoutchouc is intended for car springs, about 5 per cent. of white lead and variable proportions of carbonate of lime are added, with 5 per cent. of sulphur. This makes the product more solid and substantial, and capable of supporting greater weight without too much compression, which is objectionable. In the manufacture of ebonite, as before stated, a much larger proportion of sulphur is used; and in the cheaper kinds, when great strength is not required, various earthy substances are employed. But sulphur and caoutchouc alone, when properly mingled and raised to the required degree of heat, produce the best article. The temperature necessary to effect the proper result varies with the proportion of the ingredients, and ranges from 250° to something over 300°, this also being more or less modified by the time employed.—When India rubber is woven into fabrics, it is prepared for the purpose by slicing it into threads, with knives worked by machinery and kept wet. These threads are wound upon cylinders in a state of tension, and are woven into the fabric in this condition. In the early manufacture of fabrics of this kind a process technically called "shirring" was employed. The elastic threads, in a state of tension, were passed between rollers, and then between two other rollers over each of which was passed a strip of cloth, cotton, or silk. This brought the threads between the two layers of cloth, and the latter having been prepared with a coating of India-rubber cement, they were held there. One of these shirring machines, together with a machine for cutting the threads, was the invention of James Bogardus of New York, and was extensively used for a number of years. The goods made by that process have however entirely given place to woven fabrics; and the cutters now used are single circular knives, revolving with high speed, cutting sheets wound upon cylinders, which are given a slow rotary as well as a side motion, by which the thread

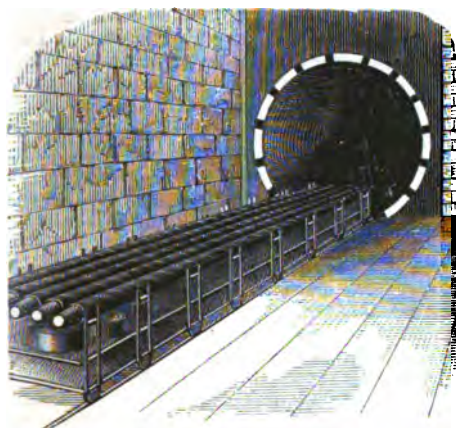


FIG. 6.—Vulcanizing Cylinder.

which is heated by live steam, or steam which is not superheated, coming immediately from the boiler, and usually at a pressure which will give it a temperature of about 240° F. When the rubber has been confined in this cylinder, at this temperature, for eight or ten hours, the true vulcanization or union of the caoutchouc

is cut in a spiral.—Vulcanized caoutchouc, under the name of hard rubber and ebonite, has of late years been applied to a great variety of uses. The best ebonite is made of pure caoutchouc and sulphur, subjected to a longer continued and higher degree of heat than the ordinary pliable article for springs, tubing, hose, &c. Optical and surgical instruments are composed in part and sometimes entirely of this substance, which is susceptible of taking a high degree of finish and is very strong and elastic. For the backs of brushes it has been found to

be well adapted, when mixed with various mineral ingredients by which its plasticity is so affected that the brush may be made by one operation in a die, the material enclosing the tufts of bristles and holding them securely without any further fastening. It has also been applied to the making of watch cases, buttons, combs, ornamental articles of dress, and many other uses.—The following table exhibits the condition of the manufactures of caoutchouc in the United States in the years 1860 and 1870:

STATES.	ESTABLISHMENTS.		HANDS EMPLOYED.		CAPITAL INVESTED.		VALUE OF PRODUCE.	
	1860.	1870.	1860.	1870.	1860.	1870.	1860.	1870.
Connecticut.....	9	18	809	1,946	\$1,265,000	\$2,840,000	\$2,276,000	\$4,229,322
Maine.....	..	1	....	9	.....	4,000	.....	31,300
Massachusetts.....	5	16	298	1,405	568,000	1,990,000	808,000	2,198,200
Missouri.....	..	1	....	4	.....	2,000	.....	4,500
New Jersey.....	5	12	817	807	870,000	1,084,000	1,308,000	1,224,400
New York.....	7	10	757	1,008	775,000	1,177,000	1,127,750	2,074,750
Pennsylvania.....	1	1	8	1	5,000	800	12,000	1,000
Rhode Island.....	2	2	118	845	154,000	408,000	244,700	1,504,400
Total in United States..	29	56	2,802	6,025	\$3,864,000	\$7,485,800	\$5,768,450	\$14,504,772

Among the products of 1870 were 1,250,000 lbs. of car springs, 906,000 lbs. of belting and hose, 552,500 dozen braces, 5,402,666 pairs of boots, and 80,000 coats. There were consumed 8,418,320 lbs. of caoutchouc, 2,934,575 yards of cloth, 2,391,451 lbs. of cotton, and 2,900 lbs. of silk; the value of all the materials was \$7,434,742. The amount of caoutchouc received at the port of New York from various countries in 1870 was about 8,500,000 lbs., and in 1871 about 9,000,000 lbs. In 1872 the imports were as follows:

From Pará.....	5,182,751 lbs.
“ Central America.....	5,094,619 “
“ Mexico.....	180,950 “
“ Cartagena.....	267,888 “
“ India.....	879,300 “
Miscellaneous.....	197,881 “
Total imports.....	11,860,929 “

The imports of caoutchouc into Great Britain for the nine months ending Sept. 30, 1872, were 18,464,752 lbs., valued at \$6,818,300.

CAPE AGULHAS. See AGULHAS.

CAPE ANN, the S. E. point of the town of Rockport, Essex co., Mass., the N. limit of Massachusetts bay, 4 m. N. E. of Gloucester, and 31 m. N. E. of Boston; lat. 42° 38' N., lon. 70° 35' W. The whole of the rocky peninsula forming the town of Rockport and part of Gloucester is also called Cape Ann, including the village of Squam in its N. W. part. This peninsula is a headland of syenite, which forms low hills, over the surface of which the rock is very generally exposed to view. The lands are strewn with boulders, many of great size; and beds of pure white sand are intermixed with the ledges and boulders. Valuable quarries of syenite for building purposes are worked conveniently for shipment. The place is much exposed to the prevalent N. E. storms; but it offers a small, well sheltered harbor among

the rocks, where coasting vessels often take refuge. There are on the shores of this harbor two fixed lights, 500 to 600 yards apart, 90 ft. above the water.

CAPE BAB-EL-MANDEB (formerly called Jebel Manbali), a conical basaltic rock, 865 ft. high, on the N. side of the strait of the same name, between the shores of Arabia and Abyssinia. (See BAB-EL-MANDEB.)

CAPE BLANCO, a low rocky point on the W. coast of Africa, in lat. 20° 47' N., lon. 17° 4' W., extending from the main shore in a S. W. direction for more than 30 m. into the Atlantic, and forming the western extremity of the Sahara. In bending to the south it partially encloses a large harbor called the Great Bay, one of the very few sheltered places of anchorage to be found on this most dangerous part of the African coast. Cape Blanco forms the western end of the great sandstone ridge called the Jebel el-Abiad (White mountains), which extends eastward into the Sahara beyond the limits of exploration. The cape is almost completely covered with shells of many kinds and sizes, the number and peculiar position of which have long furnished a perplexing question to naturalists. Sand hills formed by winds from the desert extend along the central ridge of the point, their forms constantly changing with new accumulations. Boats from the Canary islands visit the cape regularly for fishing.

CAPE BLANCO, or **Orford**, a rocky headland forming the western extremity of Oregon, and extending into the Pacific in lat. 42° 45' N., lon. 124° 45' W., about 25 m. N. of the mouth of Rogue river. It is the termination of the lofty ridge of the Umpqua mountains. A short distance S. of the cape is the harbor of Port Orford or Ewing.

CAPE BOEO (anc. *Lilybaeum Promontorium*), the westernmost point of Sicily, 1 m. from

Marsala. Being the point of the island nearest to Carthage, it became at an early period an important naval station. The naval victory of the Romans over the Carthaginians, 241 B. C., which put an end to the first Punic war, was gained near this cape.

CAPE BOJADOR. See BOJADOR.

CAPE BON, or *Ras Adder* (anc. *Hermæum Promontorium*), a headland on the N. coast of Africa, at the N. E. extremity of Tunisia, projecting into the Mediterranean in lat. $37^{\circ} 4' N.$, lon. $10^{\circ} 53' E.$, E. of the gulf of Tunis and at the N. end of the peninsula of Dakhla.

CAPE BRETON, an island lying between lat. $45^{\circ} 27'$ and $47^{\circ} 5' N.$, and lon. $59^{\circ} 40'$ and $61^{\circ} 40' W.$, belonging to the province of Nova Scotia, from which it is separated on the S. W. by the gut of Canso, 1 m. to $1\frac{1}{2}$ m. wide. The N. E. extremity of the island, Cape North, is 73 m. from Cape Anguille, the S. W. point of Newfoundland; its greatest length from N. to S. is 100 m., greatest breadth from E. to W. 85 m.; area, 8,120 sq. m.; pop. in 1871, 75,488. The island is very irregular in shape, and is nearly divided into two parts by the Bras d'Or, an inland sea with a narrow outlet. At the entrance lies Boulardrie island, between which and the main island on the S. W. is Little Bras d'Or. The Bras d'Or is 55 m. long and 20 m. wide, and varies in depth from 70 to 300 ft. The coast is for the most part rocky and elevated, and indented by numerous bays and inlets, particularly on the E. and S. The chief harbor is that of Sydney, at the head of an inlet 7 m. from the sea, on the E. coast. There are several other harbors on the E. and S. coasts. The principal harbor on the W. coast is that of Port Hood. Madame island, on the south, is reckoned a part of Cape Breton, from which it is separated by a narrow inlet called St. Peter's bay. Cape Breton is divided into the counties of Cape Breton, Inverness, Richmond, and Victoria. The chief town is Sydney, with 2,900 inhabitants. The inhabitants of the island are mainly French Acadians, Scotch and Irish immigrants, and their descendants. The Scotch are mostly from the Highlands and the western islands. There are also 200 or 300 Indians. The island contains several fresh-water lakes, the principal of which are Lake Margerie, in the N. W. division, 40 m. in circumference, the outlet of which is by a river of the same name 15 m. long, and Grand lake and Miré river or lake, in the S. division. Miré lake receives the waters of Salmon river, which flows from the west. Several rivers fall into the Bras d'Or, the most important of which are the Bedeque and Wagamatcook on the north, and the St. Denis on the west. Cape Breton terminates a low mountain range, traversing Nova Scotia from S. W. to N. E., and contains much high land. The climate is subject to considerable extremes; the mean summer heat is 80° , while in winter the mercury often falls to 20° below zero. On the E. coast the summers are usually dry; on the W. coast they

are generally more moist. Mica slate, clay slate, syenite, and primitive trap are found in all parts of the island. Gypsum is abundant, particularly along the shores of the Bras d'Or; iron ore is also found, and there are several salt springs. The most important mineral is bituminous coal, which is found in the W. part of the island, but is most abundant in the S. E. division. In 1865 there were 18 coal mines in operation, and 429,175 tons were obtained. The forests consist of hemlock, black and white spruce, white and red pine, oak, beech, birch, and maple; but the timber trade has been gradually diminishing. The chief agricultural products are wheat, barley, oats, potatoes, turnips, hay, butter, and cheese. The inhabitants also carry on domestic manufactures of cloth and flannel. Fishing is one of the chief industries, the coasts and harbors abounding with fish of various kinds. Large quantities of cod, mackerel, and herring are taken. The chief exports are timber, fish, and coal; the chief imports are British manufactured goods, corn and meal, and colonial products. A majority of the inhabitants are Roman Catholics; Scotch Presbyterians are also numerous, and there are some Episcopalians. Cape Breton sends five members to the Canadian house of commons.—The first settlement in the island was made in 1712, by the French, who called it Isle Royale, and who eight years afterward constructed the fortress of Louisbourg, on the S. E. coast. It was taken from them by the colonists of New England in 1745, and was finally ceded to Great Britain in 1763. In 1784 Cape Breton was separated from Nova Scotia, to which it had previously been politically united, but in 1819 it was reannexed. In 1856 a telegraphic cable was laid across the gut of Canso, connecting the island through Nova Scotia with the telegraphic system of the United States. A land line, connecting with the cable on the Cape Breton side, was constructed through Port Hood to Aspy bay, on the N. E. coast of the island; and in the same year a cable was laid across the entrance to the gulf of St. Lawrence from Aspy bay to Port au Basque on the W. coast of Newfoundland, while a land line connected this point again with Heart's Content. Since the landing of the first Atlantic cable in 1866, the line across Cape Breton has formed part of the intercontinental system.

CAPECE-LATRO, Giuseppe, an Italian prelate and statesman, born in Naples, Sept. 23, 1744, died Nov. 2, 1836. When very young he was appointed to the archbishopric of Tarento, which gave him the rank of primate of the kingdom of Naples. He opposed many claims of the papal see, and wrote against the enforced celibacy of the clergy. When the revolution of 1799 broke out, he accepted a public office; and upon the restoration of the Bourbons he was thrown into prison, from which he was soon liberated. During the government of Joseph Bonaparte in Naples he was minister

of the interior, and continued in that position under Joachim Murat. After the fall of Murat he lost his archbishopric, and withdrew from public affairs. His last work was a eulogy of Frederick the Great.

CAPE CHARLES, a headland at the N. entrance of Chesapeake bay, forming the S. extremity of Northampton co., Va. N. E. of it, on Smith's island, is a lighthouse with a revolving light; lat. $37^{\circ} 3' N.$, lon. $76^{\circ} 2' W.$

CAPE CLEAR, a promontory rising 400 ft. above the level of the sea, on the S. side of Clear island, county Cork, Ireland. The island, which is 31 m. long and about 1 m. wide, contains a coast-guard station, a lighthouse 455 ft. above the sea, and a telegraph station. The lighthouse is in lat. $51^{\circ} 26' 3'' N.$, lon. $9^{\circ} 29' 20'' W.$ On Fastnet rock, $8\frac{1}{2}$ m. W. by S. of Cape Clear, is another lighthouse 148 ft. above high water, which forms a landmark for American steamers. Cape Clear is the point from which ships leaving St. George's channel usually take their departure, and those arriving prefer making it their landfall.

CAPE COAST CASTLE, a town and fort of Africa, capital of the British settlements in the Gold Coast colony; lat. $5^{\circ} 7' N.$, lon. $1^{\circ} 13' W.$; pop. about 10,000. The town is regularly built, in a well wooded but poorly watered district, and has a damp, unhealthy climate. It exports gold dust, palm oil, maize, ivory, and tortoise shell. The settlement is governed by a president of council and subordinate officers. The fort, which is the best on the coast, stands on a granite rock projecting into the sea, and has near it two small outposts called Fort William and Fort Victoria. The British settlements here began in 1661.

CAPE COD, the sandy peninsula extending into the Atlantic ocean which forms the S. E. extremity of Massachusetts, and is coextensive with Barnstable county. This tongue of land, commencing at the line between Plymouth and Sandwich, extends E. about 35 m., its width beyond Sandwich rarely exceeding 8 m. It then bends N. and gradually N. W., extending about 30 m. further. The curve still continues around to the W., S., and E., enclosing the fine landlocked harbor of Provincetown. This latter portion does not average half the width of the former, and is greatly indented by bays, both on the outer and inner sides. The northern extremity is called Race point. On this there is a revolving light 155 ft. above the level of the sea, in lat. $42^{\circ} 3' 40'' N.$, lon. $70^{\circ} 14' 48'' W.$ There are many other lighthouses upon the cape, and the so-called Cape Cod light is on the Clay Pounds (highlands), 200 ft. above high-water mark, in lat. $42^{\circ} 2' 24'' N.$, lon. $70^{\circ} 4' 18'' W.$ This is a fixed light. Cape Cod bay is the body of water included in the arm of the cape and opening into Massachusetts bay on the north.—Cape Cod was discovered May 15, 1602, by Bartholomew Gosnold. To the "mighty headland," as he called it, he gave the name of Cape Cod, from the quantity of codfish taken

off its shores. His people landed and spent a day wandering about, the first authenticated visit of whites upon the coast of Massachusetts. It continued to be known to the occasional voyagers of this period; but on Nov. 9, 1620, it was made memorable by the arrival of the Mayflower, which brought to New England the first company of permanent settlers, and the next day cast anchor in the harbor of Provincetown. Here, on the 11th, before the company disembarked, was drawn up the famous compact by which they became a body politic, subject "to such government and governors as should by common consent" be chosen. At that time the extremity of the cape does not appear to have been so entirely destitute of agricultural interest as it has since become. The pilgrims found on the shores patches where the Indians had planted corn, and obtained supplies of the grain. Mention is also made of their bringing back to the vessel a boat load of juniper. The lower portion of the cape is for the most part a waste of barren sand hills, covered here and there with a little beach grass; among them are found numerous ponds, by the sides of which a little arable land is occasionally obtained; and along the shores are extensive salt-water marshes. Toward the head of the cape pitch-pine and oak trees of several species form extensive forests, in which the pines predominate. The cape is more destitute of rocky formations than of trees. Not a ledge rises itself anywhere above the sand, nor is one met with in sinking wells, until passing in a northerly direction beyond the bounds of Plymouth. Boulders are abundant, and often, of great size, particularly near the head of the cape. The depth of sand is nowhere known; about Provincetown it is kept in motion by the winds, and its hills are shifting dunes. The curved form of the extremity suggests the possibility of its having been produced by the prevalence and preponderance of the N. E. winds, the heavy surf rolling up the sands upon the shore, and the winds moving them gradually toward the S. W.—Though a sandy district, the cape is no barren waste; its numerous bays furnish many harbors, and about these are thriving villages which are the nurseries of seamen, and have furnished the masters of many of the best ships of the American merchant service.

CAPE COLONY, or *Cape of Good Hope*, a British possession comprising nearly all of the African continent south of lat. $28^{\circ} S.$, and between lon. $16^{\circ} 30'$ and $28^{\circ} 30' E.$ The colony is bounded N. by the Gariep or Orange river, which separates it from the Kalahari desert and the Orange River Free State, and by Basuto Land, E. by Caffraria, which interposes between it and the British colony of Natal, S. by the Indian ocean, and W. by the Atlantic; area, 200,610 sq. m.; pop. in 1865, 566,158, including British Caffraria, of whom 187,489 were whites, 164,466 Caffres, 81,598 Hottentots, and 132,603 "colored." This colored population consists of Malays and Africanders, the offspring of a

Dutch father and a colored mother. The Hottentots are the lowest in intellectual grade; those of them who have not been driven into the desert regions are employed as servants and shepherds or herdsmen. The Caffres are usually tall and robust, varying in color from a dark bronze to a jet black. They practise agriculture to a limited extent, cultivating maize, millet, beans, and watermelons; they have the art of working in iron, and manufacture a rude sort of earthenware. They practise circumcision, are polygamists, and have many of the worst vices of savages. They are a pastoral rather than an agricultural people; many of them own large herds of cattle, and consider the herds and flocks of the whites as legitimate plunder. The Malays are usually Mohammedans; they are active and industrious, but passionate and revengeful. Of the whites a small portion are British or of direct British descent, chiefly government officials or traders in the towns, but including a few graziers and sheep farmers. The great majority of the whites are Boers, who are mostly of Dutch descent. (See *BOERS*.) The colony receives few accessions from immigration, not more than a few hundreds in any year.—From each ocean the country slopes upward N. and E. toward the interior. From the Southern or Indian ocean it rises in three successive plateaus, increasing in height as they recede from the sea, and each separated from the others by mountain ranges. The first range, the Lange Kloof (Long Pass), runs from W. to E. nearly parallel with the Indian ocean, enclosing between it and the S. coast an irregular belt, from 20 to 60 m. broad, indented with bays, traversed by many streams, having a fertile soil, clothed with plants and shrubs, and here and there a group of forest trees. This plateau has frequent rains and a mild and equable climate. The second range, the main portion of which is called the Groote Zwarte Bergen (Great Black mountains), and the smaller, toward the west, the Kleine Zwarte (Little Black), runs nearly parallel with the Lange Kloof, but is loftier and more rugged, sometimes reaching to the height of 4,000 ft., and consisting in some parts of double and treble ranges. The plateau between this and the Lange Kloof has an average breadth of 40 m. Its surface is varied; in some parts are steep barren hills; in others *karroos*, plains of arid clay, with here and there a patch of watered and fertile land. The climate of this plateau is less equable than that of the former one. The third range are the Nieuwveld (New Field) mountains. For 200 m., between lon. 21° 45' and 25° E., the Nieuwveld runs nearly parallel with the Groote Zwarte, at a distance of about 80 m. and nearly on the parallel of 32° S. Its E. extremity is called the Sneeuwbergen (Snow mountains), the highest range in S. Africa, the loftiest summit reaching to about 10,000 ft. In about lon. 25° E. it sends off two branches, one N. E., the other S. E. On the west, in lon. 20° 45' E., the Nieuwveld joins with a range running N. W., nearly parallel with the Atlan-

tic coast. This range, known as the Roggeveld (Rye mountains), has an elevation of 5,000 ft. toward the south, while at the extreme north of the colony the Atlantic coast range reaches a height estimated at 9,000 ft.—What may be considered the habitable part of the colony constitutes less than a half of the whole. It lies mainly on the narrow slope toward the Atlantic, W. of the Roggeveld mountains, and the broader plateau S. of the Nieuwveld range, facing the Indian ocean. In this region, between the Nieuwveld and the Groote Zwarte mountains, is the Great Karroo, nearly 800 m. long and 80 broad. It is not strictly a desert, but rather a table land 3,000 ft. above the sea, thinly covered with an argillaceous soil resting upon a substratum of rock and gravel, with here and there steep slaty hills, and traversed by streams running southward, which become torrents after a rain storm, but in dry seasons are merely chains of shallow pools, barely sufficient to afford water to the herds of wild animals which resort to them by night. The remainder of the habitable part is fairly adapted to agriculture.—The colony has a coast line of about 1,225 m., broken by numerous bays, the principal of which are St. Helena, Saldanha, and Table bays on the W. coast; False bay, with its indentation St. Simon bay, St. Sebastian, Moessel, Plettenberg, St. Francis, and Algoa bays on the S. coast. Notwithstanding this great extent of coast line, there are few harbors. Saldanha bay, 65 m. N. N. W. of Cape Town, is the best. In Table bay, at Cape Town, ships lie safely from September to May, during the prevalence of the S. W. monsoon; but from June to August, when the N. W. winds set in, they are obliged to take refuge in Simon bay, on the opposite side of the peninsula of Cape Good Hope. Simon bay is the station of the British Cape squadron, and is frequented by vessels to and from India. Plettenberg bay is open to the S. E., but affords safe anchorage in 8 or 10 fathoms water, and forms a good shelter during strong N. E. and N. W. gales for vessels intending to make for Table bay. Algoa bay, still further E., is exposed to the prevailing winds, but affords good anchorage. Port Elizabeth, the principal port after Cape Town, is situated on this bay.—On the Atlantic side, where the mountains approach the ocean, the rivers are few, short, and with little volume of water. The principal ones are the Kowrie (Buffalo), Zwarte Doorn (Black Thorn), Olifant (Elephant, a name borne by several others), and Great Berg, which falls into the bay of St. Helena. Of those which, having a general S. course, fall into the Indian ocean, the principal are the Breede (Broad), Gauritz, Gamtoos, Sunday, Great Fish, Keiskamma, and Great Kei, which forms the E. boundary of the colony, separating it from Caffraria. None of these rivers are navigable except for short distances by small craft; the largest of them, the Gauritz and the Gamtoos, are moreover obstructed by bars at their mouths. The Gariep or Orange

river, which forms the N. and partially the N. E. boundary, is 1,200 m. long, flowing from E. to W. through a large part of South Africa. In its lower course, where it borders on Cape Colony, it has an average breadth of a mile, and during the rainy season a depth of 50 ft. The Orange river receives few affluents from Cape Colony; the principal is the Groote Hartbeest (Big Antelope), known in its upper course as the Zak, which, after receiving several affluents, falls into the Orange in lat. $28^{\circ} 45' S.$, lon. $21^{\circ} E.$ The Groote Hartbeest receives most of the scanty drainage of the region N. of the Nieuwveld mountains. There are properly no lakes in the colony; but there are occasionally ponds or pools, some salt and others fresh. The principal salt pond is the "Commissioner's Salt Pan," lat. $28^{\circ} 45' S.$, lon. $21^{\circ} E.$ —The prevailing geological formation is sandstone resting upon granite. Wherever the granite approaches the surface, there are numerous perpetual springs; but wherever, as is usually the case, especially in the N. W. half, the granite lies deep beneath the surface, springs are rare. Limestone is found in the E. parts; sand and clay form the surface of the great plains; alluvial loam and black peat are found near the sea. The colony is apparently poor in minerals. There is considerable copper, and a little lead, some of which contains a small percentage of silver. The soil of the Great Karroo is strongly impregnated with iron. Of coal there are some traces. Besides these, salt, alum, and saltpetre are the chief mineral products. Sulphurous, nitrous, and other mineral springs are not infrequent. Carnelian and bloodstones are the principal precious stones, unless it shall be found that the diamond region extends into the colony.—The climate is in general equable, owing to the proximity of the two oceans, the mountain ranges, and the elevation of the plateaus. At Cape Town the mean temperature throughout the year is 67° , that of the coldest month being 57° , of the hottest 79° . In the interior the variation is much greater. On the great plains toward the north, really forming a part of the Kalahari desert, the heat is usually intense during the day, while the nights are uncomfortably cold.—The great deficiency of the colony is the lack of water, arising from its geological structure and the extreme irregularity of the rainfall. In many districts three successive years sometimes pass without a single shower. This peculiarity decides the general character of the vegetation. Near the Cape of Good Hope the flora is varied, but the flowers, though gorgeous in hue, lack fragrance. The trees are mostly mimosas and other thorny species, with scanty foliage, rarely attaining any considerable size. The distinguishing feature of the vegetation is the preponderance of plants with bulbous and succulent roots, and others of the ground species. Not infrequently, by digging a foot into what appears dry sand, one comes upon a bulb, twice the size of an orange, filled with moisture; and after a rainy season

the whole region is carpeted with creeping vines, bearing a profusion of melon-like fruits. Still the prevailing aspect of a great part of the colony is one of extreme aridity. The line of the watercourses is usually marked by a narrow fringe of mimosas; but elsewhere the region shows no vegetation except a few stunted shrubs, and what appear the dried-up vines of succulent plants, the deep-lying roots of which are fortified by a tenfold net of fibres under the upper rind. During the dry season these appear parched into a scanty brown stubble; but when the ground becomes moistened by rains these plants burst into sudden life, and the whole region seems transformed into a garden, cropped by vast herds of antelopes, zebras, quaggas, and other herbivorous animals, which seem to know by instinct where they will be able to find nutriment; these herds are followed by beasts of prey. Many of the European grains and fruits are cultivated. Wheat flourishes fairly: the potato thrives, yielding two crops a year; tobacco does well in the proper soil; cherries and apples deteriorate, but figs, apricots, almonds, and oranges thrive. The vine was long since introduced into the district near the Cape of Good Hope, and Cape wine used once to pass for madeira, but of late years it has deteriorated and the production is greatly diminished; but there is a vineyard near Cape Town producing the Constantia wine, which bears a high repute. There appears, however, to be a considerable tract well adapted to the culture of the grape. Still the colony is rather a grazing than an agricultural country, the agricultural products being just sufficient for home consumption. In 1865 there were produced 1,389,878 bushels of wheat, 482,535 of barley and rye, and 324,683 of maize. The grazing farms are large, comprising from 3,000 to 10,000, and sometimes 15,000 acres. There are great herds of cattle; oxen are the chief beasts of burden and draught, teams of 20 and more being often attached to the great Cape wagons in use all over the colony. In 1865 there were 692,514 head of cattle, 226,610 horses, and 2,437,444 goats, the flesh of which constitutes the main food of the Hottentot farm servants. Swine are of little account. Turkeys, geese, ducks, and poultry are abundant. The native sheep, notable chiefly for their enormous tails, often weighing 20 lbs., are valueless for their fleece; but fine-wooled breeds from Spain, Saxony, and England have been introduced, and flourish remarkably. In 1865 the whole number of sheep was 9,826,063. Wool has become the main article of export, its value constituting fully three quarters of the entire exports.—The elephant, rhinoceros, hippopotamus, lion, leopard, hyæna, jackal, zebra, quagga, boar, antelope, monkey, raccoon, and squirrel are indigenous. The larger game has been in great part extirpated or driven from the settled portions. The rhinoceros is nearly extinct; the hippopotamus is now found only in the Great Fish and Great Kei rivers; lions

and elephants are rare; the elephant teeth which form a considerable part of the exports are mainly brought from beyond the Orange river. Leopards and hyenas are still numerous in the eastern districts. The Cape buffalo (*bos Caffr*), one of the largest and most untamable of the genus, is still met with. Antelopes of many species are numerous on the great plains, where after a rainfall, which gives life to vegetation, herds of many thousands are sometimes encountered. Eagles, vultures, and other birds of prey are found. In the Great Karroo and along the skirts of the northern desert ostriches are abundant, often roaming in large flocks. Small birds are numerous, with beautiful plumage, but deficient in song. Lizards and other amphibia are abundant in the rivers; the serpent tribes are numerous and venomous. Some of the rivers are well stocked with fish; but generally they are not abundant, probably because many of the streams are so frequently dried up. A particular variety of locust (*gryllus devastator*), which is bred in the northern desert region, in some years commits great ravages; this forms a considerable part of the food of the Bushmen and Hottentots. But the great hunting region of S. Africa, described by Gordon Cumming, Baldwin, Andersson, and others, lies mainly N. and E. of the limits of Cape Colony.—The trade is mainly with Great Britain. In 1869 the total imports were £1,819,723, of which £1,826,531 were from Great Britain and her colonies; exports, £2,681,075, of which £2,352,344 were to Great Britain and colonies. The total imports from Great Britain in 1866 amounted to £1,399,024, consisting of apparel and haberdashery, £377,452; cotton goods, £333,840; woollen goods, £83,870; leather goods, £57,270; beer and ale, £47,528; iron, £43,307; hardware, £42,069; linen goods, £21,802; books, £20,443. The exports to Great Britain in 1866 were in all £2,719,323, consisting of wool, £2,179,509; hides and skins, £159,265; ostrich feathers, £105,973; copper ore, £73,572; cotton, £29,406; sugar, £92,560; elephants' teeth, £19,779; coffee, £12,854; rice, £15,868; aloes, £12,443; wine, £2,010. In 1870 the exports to Great Britain were £2,433,697; imports from Great Britain, £1,547,029. The quantity of wool exported to Great Britain increased annually from 18,877,644 lbs., valued at £1,316,976, in 1864, to 34,225,569 lbs., valued at £2,105,416, in 1867; from which they fell to 28,813,583, valued at £1,835,390, in 1870.—The present form of government dates essentially from 1853, but was somewhat modified by the act of parliament, 1865, incorporating British Caffraria with Cape Colony. The executive power is vested in the governor and an executive council appointed by the crown. The governor has a salary of £5,000, besides £1,000 as her majesty's high commissioner, and £500 allowance for a country residence. The legislative power rests in a legislative council of 21 members, 10 of whom are elected for 10 years and 11 for 5 years; and a house of assembly

of 66 members elected for 5 years. Members of the council must possess real estate to the value of £2,000, or movable property to the value of £4,000. With the exception of salaried officers and a few others, any colonist is eligible to the assembly. Voters must have an income from property, salary, or wages, of from £25 to £50. The military force consists of about 6,000 men, including a detachment of royal artillery, a party of the royal engineers, and a regiment of mounted riflemen, termed the Cape cavalry, the privates and non-commissioned officers of which are mainly Hottentots. The naval force is under the command of a rear admiral, with authority over the E. and W. coasts of Africa, Mauritius, and St. Helena. The revenue is derived in great part from duties on imports; in 1869 it amounted to £593,245. The expenditures are mainly for interest on the public debt, the police, jails, and convicts; in 1868 they amounted to £656,172. The public debt in 1867 was £1,101,650, most of it bearing interest at 6 per cent. It is proposed to pay the whole by instalments, extending to the year 1900. The Dutch Reformed church includes the entire Dutch population and many of the colored inhabitants, and is the predominant sect. The church of England has two bishoprics. The Wesleyans form a considerable sect. There are also Independents, Lutherans, and a few Scotch Presbyterians. There are about 6,000 Roman Catholics, who have two bishops, one residing at Cape Town, the other at Graham's Town. All these denominations receive aid from government. The entire amount expended for religious purposes in 1864 was £15,270. There is a good system of public education. In every district there is a free school sustained by government. There are two colleges, the South African college, founded in 1829, and the Bishop's college. The sum expended for educational purposes in 1864 was £17,510. There are also a number of missionary schools.—The colony is held to be important for Great Britain because it is the key to the Indian ocean, and forms a depot where troops can be collected and forwarded to India, the eastern archipelago, and Australia. For administrative purposes the settled part is divided into the following districts or counties: Albany, Albert, Aliwal, Beaufort, British Caffraria, Cape, Clan William, Colesberg, Cradock, George, Graaf Reynet, Malmesbury, Paar, Picketberg, Queenstown, Richmond, Riversdale, Somerset, Stellenbosch, Zwellendam, Uitenhage, Victoria, Worcester. Besides these there are the unoccupied regions still bearing the names of Little Namaqua Land and Great Bushmen Land, bordering the Orange river on the north; and S. of these, but N. of the Nieuw-veld range, a large district named Victoria West, in which are a few settlements.—It seems probable from the statement of Herodotus that the Cape of Good Hope was sailed round by the Phoenicians about 600 B. C.; but it was practically unknown to the civilized world un-

till nearly 2,100 years later, when the Portuguese Bartolomeu Diaz reached it (1487). In 1497 Vasco da Gama rounded the cape on his voyage to India; but no serious attempt at settlement was made till 1650, when the Dutch East India company established a colony for the purpose of raising provisions for their vessels to and from India. They found the country in possession of a people calling themselves Quaquas, but to whom the Dutch gave the name of Hottentots, from *hot en* (and) *tot*, two syllables of frequent occurrence in their language. The Dutch colony for a considerable time was confined to the neighborhood of the cape, but the limits were gradually extended, the natives being driven back or reduced to slavery. They also introduced many Malay and negro slaves. Besides the Dutch settlers there were many Germans, Flemings, and Portuguese. In 1686 there was a considerable immigration of Huguenots who left France after the revocation of the edict of Nantes. In 1795 the colonists attempted to free themselves from the Dutch rule, but the British government sent a fleet, and took possession of the colony in the name of the prince of Orange; and it was ruled by British governors till 1802, when it was restored to Holland. Upon the renewal of the European wars in 1806, the British again took possession; and the colony was formerly ceded to them by the king of the Netherlands at the general peace of 1815. There have been several wars with the Caffres. The first was in 1811; the second in 1819, when the boundary was extended to the Kei, the present eastern limit; but the region between that river and the Keiskamma was soon restored to the Caffres. The third war took place in 1835, at the close of which the territory as far as the Kei river was again given up to the British, the inhabitants being declared subjects of the crown; this district formed till 1865 the colony of British Caffraria. The fourth Caffre war lasted from 1846 to 1848. In 1850 another war broke out, which lasted till 1852. The final result of this was to establish the present boundary of Cape Colony, the British abandoning all claim to the region N. E. of the Nu Gariep, or S. W. branch of the Orange river. In 1820 5,000 Scotch emigrants sent out by the government landed at Algoa bay, and laid the foundation of the settlements on the eastern borders, which have been pushed much further into the interior than any others, and now form the most flourishing portion of the colony. In 1834 the slaves were emancipated. The troubles with the Boers, commencing in 1835, resulted in the establishment of two independent republics bordering on Cape Colony. (See BOERS.) In 1848 the British government undertook to make the Cape a penal colony, mostly for political offenders. The colonists opposed this, and formed an anti-convict association, the members of which pledged themselves to hold no intercourse of any kind with any person who should

in any way be connected with the landing, supplying, or employing of convicts. The association included nearly all the people near Cape Town. On Sept. 19, 1849, a vessel entered Simon bay having on board 289 convicts, mostly persons who had been implicated in the Irish insurrection. Great indignation was aroused, and the governor agreed not to land the convicts, but to keep them on board the ship until he should receive orders to send them elsewhere. They were finally sent to Tasmania. The agitation thus aroused continued, its purpose being now to secure a representative government for the colony. This was granted in 1853, and a constitution was framed, essentially the same as that which is now in force.

CAPE COMORIN, the southern extremity of Hindostan, in the state of Travancore, lat. $6^{\circ} 5' N.$, lon. $77^{\circ} 30' E.$, forming a circular, low, sandy point, which is not discernible above the distance of 12 to 16 m. from the deck of a large ship. A bold summit called Comorin peak, 18



Cape Comorin.

m. N. of the cape, is the southern termination of the Western Ghats, and has from a distance been often taken for the cape itself. Within a short distance of the cape lies a rocky islet, high above water; and about 3 m. from this islet are a fort and a village, a church, and some ancient temples, being the remains of the once famous town of Cape Comorin.

CAPE ELIZABETH, a rocky headland on the S. E. coast of Maine, in Cumberland co., at the S. E. extremity of a town to which it gives its name, 6 m. S. by E. of Portland, in lat. $43^{\circ} 33' N.$, lon. $70^{\circ} 11' W.$ It rises to the height of about 50 ft. above the ocean, and on it have been erected two lighthouses about 300 yards apart, their lights being 140 ft. above sea level.

CAPE FAREWELL, a lofty, rugged, and precipitous headland forming the southern extremity of Greenland, and projecting into the north Atlantic from the small island of Cape

Farewell, in lat. 59° 49' N., lon. 43° 54' W. This promontory occupies perhaps the most exposed situation of any point of land on the globe; a strong current sets round it from E. to W., bringing down the E. coast of Greenland an immense body of ice, which sometimes presses together about the cape in such a way as to form a belt surrounding it, and extending more than 100 m. to sea on its three exposed sides. The ice generally appears in January and disappears in September.

CAPE FEAR, the S. point of Smith's island, near the mouth of Cape Fear river, North Carolina; lat. 33° 48' N., lon. 77° 57' W. There is a lighthouse about a mile from the shore.

CAPE FEAR RIVER, a stream formed by the union of Haw and Deep rivers at Haywood, Chatham co., N. C. It flows S. E. and enters the Atlantic by two channels, between which lies Smith's island. The water is from 10 to 14 ft. deep over the bar at the main entrance. This is the largest and most important river which lies wholly within the state, and the only one in North Carolina which flows directly into the sea. It is navigable by steamboats to Fayetteville, 120 m. from its mouth, and by means of dams and locks a communication has been opened with the coal mines of Chatham co. At Averbysborough the river falls over the ledge which separates the hilly from the low region of the state. After this it flows through a flat, sandy district, having extensive forests of pitch pine. Its length, including one of the head branches, is about 300 m.

CAPEFIGUE, Jean Baptiste Honoré Raymond, a French historian, born in Marseilles in 1802, died in Paris in December, 1872. He early became a journalist in Paris and a prolific writer on historical subjects, mainly in the interest of reactionary institutions. Academical prizes were awarded to his *Histoire de Philippe Auguste* (4 vols., 1829) and *Histoire philosophique des Juifs depuis la décadence des Machabées jusqu'à nos jours* (1833). Prominent statesmen assisted him in the compilation of his *Histoire constitutionnelle et administrative de la France depuis la mort de Philippe Auguste jusqu'à la fin du règne de Louis XI.* (4 vols., 1831-'3), and he subsequently published more than 70 volumes relating to various periods of history from Francis I. to Louis Philippe. After the downfall of the latter in 1848, he had no longer access to the archives of the foreign office. A second edition of his *Diplomates européens* appeared in 1845, and he published various other works, including several on the history of the Christian church (7 or 8 vols., 1850-'58); *Histoire des grandes opérations financières* (4 vols., 1855-'8); and after 1858 a series of volumes relating to the mistresses of French kings, or *reines de la main gauche*, and to female sovereigns, or *reines de la main droite*, as he proposed to group them together, though many of the volumes were published separately up to within a short period before his death.

CAPE FINISTERRE (Lat. *Finis Terræ*), a lofty headland, the most W. point of Spain, in the province of Coruña, extending from a small peninsula S. W. into the Atlantic in lat. 42° 54' N., lon. 9° 21' W. It has given its name to two battles fought in its neighborhood between the French and English, the first in 1747, and the second in 1805; both resulted in victories for the English.

CAPE FRIO, a promontory of Brazil, 80 m. E. of Rio de Janeiro, in lat. 23° 1' S., lon. 41° 58' W. It rises to a height of 1,570 ft. above the sea, and is formed of a rugged and picturesque mass of granite. A lighthouse stands upon it. The port of Cabo Frio is 8 m. N. N. W. of the cape.

CAPE GATA (Sp. *el cabo de Gata*; often called Cape de Gatte), a promontory of Spain, bounding the E. extremity of the bay of Almería, on the coast of Granada, and consisting of rocks about 24 m. in circuit and 18 m. broad. The most celebrated of them, 15 m. S. E. of the city of Almería, is the ancient Promontorium Charidemi, the Moorish Kheyran, and is formed of crystals, spars, and agates. In the centre of the promontory are four adjoining hills, and the other parts are locally known as "the port of silver" (*el puerto de la plata*). The cape was formerly a resort of Moorish pirates. The high winds prevailing here gave rise to the saying among sailors: "At Cape de Gatte take care of your hat."

CAPE GIRARDEAU, a S. E. county of Missouri; area, 875 sq. m.; pop. in 1870, 17,558, of whom 1,646 were colored. It is separated from Illinois on the east by the Mississippi river, and is drained by the head streams of the Whitewater and by Apple creek. Good timber is found, and the cypress especially grows in nearly all parts. The surface is level, and the fertile soil is carefully and extensively cultivated. The St. Louis and Iron Mountain railroad passes through the S. W. part. The chief productions in 1870 were 260,445 bushels of wheat, 538,487 of Indian corn, 136,601 of oats, 3,292 tons of hay, 30,081 lbs. of wool, and 55,045 of tobacco. There were 5,454 horses, 1,415 mules and asses, 3,862 milch cows, 5,204 other cattle, 15,297 sheep, and 27,784 swine. Capital, Jackson.

CAPE GIRARDEAU, a city of Cape Girardeau co., Mo., on the Mississippi, 100 m. S. S. E. of St. Louis; pop. in 1870, 3,585, of whom 502 were colored. It is situated in a rich and well cultivated country, and has a good landing. Two weekly newspapers are published. It is the seat of St. Vincent's college, a Roman Catholic institution.

CAPE GUARDAFUI, or *Ras Aser* (anc. *Aromata promontorium*), the promontory forming the E. extremity of the mainland of Africa, and the N. E. termination of the territory of Somali, and extending into the Arabian sea S. of the gulf of Aden, in lat. 11° 50' N., lon. 51° 21' E. It is a continuation of the Sangali mountains, and of the mountain known to the

ancients as Elephas. Spices were in ancient times brought from the region near it, and its ancient name was given it on this account.

CAPE HATTERAS, the easternmost point of North Carolina, projecting from a narrow sandy beach, separated from the mainland by the broad bay called Pamlico sound; lat. $35^{\circ} 14'$ N., lon. $75^{\circ} 30'$ W. S. of the capes of the Delaware, no land stretches so far out into the Atlantic as Cape Hatteras. The Gulf stream, in its E. and W. vibrations, often flows within 20 m. of the cape, crowding coasting vessels bound S., and consequently seeking to avoid the N. E. current, near to the shore. The difference of temperature between the hot airs of the gulf and the breezes along shore and from the land engenders frequent commotions in the atmosphere at this place; and no point on the coast is more noted for its frequent and dangerous storms. There is a lighthouse $1\frac{1}{2}$ m. from the outermost point.

CAPE HAYTIEN, or *Haitien* (formerly Cape François and Cape Henry), a seaport town on the N. coast of Hayti. Before the Haytian revolution broke out it was a handsome city, and some traces of its former elegance still remain. It has the safest harbor of Hayti, tolerably defended, and a fair trade with the United States, Great Britain, France, and Germany. In 1789 it had 18,500 inhabitants; before the earthquake of 1842 it had still 9,000; in 1851 the population had diminished to about 6,000, but in 1871 it was estimated at 15,000. Upon the reorganization of the Catholic church Cape Haytien was made the seat of a bishopric.

CAPE HENLOPEN, a promontory on the E. coast of Delaware, at the entrance of Delaware bay, 13 m. S. S. W. of Cape May; lat. $38^{\circ} 47'$ N., lon. $75^{\circ} 5' 30''$ W. On it is situated a fixed light, 182 feet above the level of the sea.

CAPE HENRY, a promontory on the coast of Virginia, at the S. entrance of Chesapeake bay, 12 m. S. by W. of Cape Charles; lat. $36^{\circ} 56'$ N., lon. $76^{\circ} 4'$ W. It has a fixed light, 120 ft. above the level of the sea.

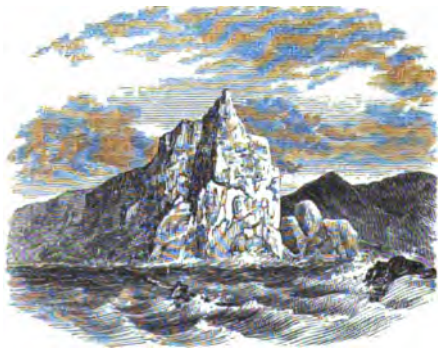
CAPE HORN, a headland of an island of the Fuegian archipelago, commonly regarded as the S. extremity of America; lat. $55^{\circ} 59'$ S.,

lon. $67^{\circ} 14'$ W. It is a steep, black rock, with bare and lofty sides and pointed summit. It was formerly considered a very dangerous place to pass, but the difficulties of "doubling the cape" are now far less formidable. It is no longer doubled, however, by steamers, which now always pass through the strait of Magellan. It was first discovered by the English navigator Sir Francis Drake in 1578, unless he was anticipated, as is claimed, by Garcia Jofre de Loaya, a Spanish commodore, in 1525; but it was first doubled by the Dutch navigators Le Maire and Schouten, in 1616, the latter of whom gave it the name of his native city (Hoorn).

CAPE ISLAND. See **CAPE MAY**.

CAPEL, Arthur, lord, an English royalist, elected to the long parliament in 1640, beheaded March 9, 1649. He voted for the death of Strafford, and then, returning to the cause of Charles I., raised and maintained a troop in his interest, and fought against the parliamentarians at Bristol, Exeter, Taunton, and Colchester. Captured in the last named city, he was condemned for treason, and met his death with firmness. He wrote "Daily Observations or Meditations, Divine, Moral, and Political."—His son, also named ARTHUR, born in 1635, created earl of Essex by Charles II. in 1661, was lord lieutenant of Ireland, 1672-'6. Afterward involving himself among the enemies of the court, he was arraigned for participation in the Rye House plot, and was found with his throat cut in the tower, July 13, 1683.

CAPEL, Thomas John, an English Roman Catholic clergyman, born in Brompton, Kent, Oct. 28, 1835. He received his early education at Layton and at Hastings. In 1852, at the age of 17, he associated himself with a band of young men who, under the leadership of the Rev. J. M. Glennie, started at Hammersmith, London, a normal training college for the education of schoolmasters. Lord Edward Howard, brother to the late duke of Norfolk, and himself lately raised to the peerage, took great interest in this institution, and provided it with an annual competition and prize, entailing in favor of the successful candidate many valuable advantages. In 1856 Thomas Capel was appointed vice principal of the college. In the same year he entered the ecclesiastical state, and was ordained priest in 1859 by Cardinal Wiseman. Immediately afterward he fell seriously ill, was obliged to resign his post as vice principal, and sent to seek restoration of health at Pau in the Pyrenees. He founded there a mission for English-speaking Catholics, and labored in it till November, 1869. The pope, as a mark of appreciation for this special work, in 1867 made Mr. Capel one of the honorary private chamberlains of his court (this office involving the Roman title of *monsignore*), two years later raised him to the rank of private chamberlain, and in 1872 made him domestic prelate, a dignity giving him precedence equivalent to that of a bishop.



Cape Horn.

Each degree of *monsignore* entitles the bearer to assume a purple robe. Since 1869, when Mgr. Capel returned to England, he, as private chaplain to the marquis of Bute (an English peer has the right of nominating several honorary private chaplains), has devoted himself to preaching, an occupation for which he is singularly fitted. His address and delivery are very engaging, and his powers of persuasion as well as of argument no less strong.

CAPE LA HAGUE, a headland of France, forming the N. W. extremity of the peninsula of Cotentin, department of La Manche, and extending into the English channel, in lat. $49^{\circ} 45' N.$, lon. $1^{\circ} 55' W.$, about 16 m. N. W. of Cherbourg. On its summit is an ancient castle; and one of the most conspicuous lighthouses of the channel coast stands upon it, 160 ft. above the sea, its light being visible at a distance of nearly 15 m. The battle of La Hogue, 1692, in which the combined Dutch and English fleet defeated the French, was not fought off this cape, as is often erroneously stated, but off the fort of La Hogue or La Hougue, on the E. coast of Cotentin; the similarity of the names has caused some confusion as to the orthography of Cape La Hague.

CAPELL, Edward, an English Shakespearian commentator and critic, born at Troston, Suffolk, in 1718, died in London, Feb. 24, 1781. Under the patronage of the duke of Grafton, he became deputy inspector of plays, an office which left him leisure for his Shakespearian studies. He published "Prolusions, or Select Pieces of Ancient Poetry" (1760); "Mr. William Shakespear, his Comedies, Histories, and Tragedies," &c. (10 vols. 8vo, 1767); and "Notes and Various Readings of Shakespear" (4to, 1776). "The School of Shakespear" (3 vols. 4to, 1783) was issued two years after the author's decease.

CAPELLA, Martianus Minus Felix, a writer supposed to have flourished in the latter part of the 5th century, and to have been a native of Carthage. His principal work is an allegorical medley in prose and verse entitled *Satyræ de Nuptiis Philologiae et Mercurii*. It consists of nine books, of which the first two describe the marriage of Philology and Mercury, and the remaining seven treat of the liberal sciences. Copernicus is believed to have derived a hint of his system from an assertion in one of these books that Mercury and Venus revolve about the sun; and Boëthius is said to have taken from Capella the model of his *Consolationes Philosophicæ*. The best editions of Capella are those of Hugo Grotius (8vo, Leyden, 1599) and Kopp (4to, Frankfort, 1836).

CAPELLO, Bianca, grand duchess of Tuscany, born in Venice in 1542, died at Poggio, Oct. 19, 1587. In 1563 she eloped with a banker's clerk named Pietro Buonaventuri, who put himself under the protection of Francesco de' Medici at Florence. Bianca's beauty and accomplishments fascinated Francesco, and although but recently married to Joanna, archduchess

of Austria, he caused the Venetian woman to reside in his palace, attaching her husband to his household as steward. In 1570 Buonaventuri was put to death by order of Francesco, who, on the decease of his father Cosmo I., had ascended the throne of Tuscany. Bianca presented him with a son Aug. 29, 1576, who however was not her own; and in order to preclude the detection of the imposture, she caused the assassination of most of those who had assisted her in its perpetration. In 1577 Joanna of Austria bore a son to the grand duke, and as she soon afterward died Bianca persuaded Francesco to make her his wife. The marriage was approved of by Philip II. of Spain, and ratified by the republic of Venice, the official marriage ceremony taking place in October, 1579. In 1582 Francesco's son by Joanna of Austria died, and Bianca endeavored to reconcile herself with Francesco's brother, the cardinal Fernando de' Medici, who in all probability would succeed him as grand duke. In October, 1587, the two brothers and Bianca met at Poggio, and a few days afterward the grand duke and Bianca were taken suddenly ill, and both died. Bianca had ever been an object of hatred to her brother-in-law, and it was believed that Fernando had poisoned her with her husband; but there is no evidence to prove it.

CAPE LOOKOUT, a headland on the E. coast of North Carolina, 85 m. S. W. of Cape Hatteras; lat. $34^{\circ} 37' N.$, lon. $76^{\circ} 33' W.$ There is a lighthouse on the cape, with a light 100 ft. above the sea.

CAPE MATAPAN (anc. *Promontorium Tænarium*), a promontory of Greece, forming the southern extremity of continental Europe, extending into the Mediterranean in lat. $36^{\circ} 28' N.$, lon. $22^{\circ} 29' E.$ The name Tænarum, or Promontorium Tænarium, was applied by the ancient Greeks not only to the headland, which is the only part indicated by the modern name Cape Matapan, but also to the small peninsula itself which lies N. of it, and is connected with the great Taygetic peninsula by a narrow isthmus. Leake believed that the ancients called the headland *Μέτωπον*, from which he derives the present name. Tænarum was sacred to Neptune, and was a sanctuary among the Achæans. The temple of the god stood near the cape, and its remains are still to be seen a little E. of the junction of the promontory and the mainland.

CAPE MAY, a county at the S. extremity of New Jersey; area, 250 sq. m.; pop. in 1870, 8,349. Its E. boundary is formed by the Atlantic; Delaware bay washes its W. shore, and Tuckahoe creek makes a part of its N. border. The surface is level and the soil entirely alluvial. On the Atlantic coast is a beach covered for the width of from $1\frac{1}{2}$ to 2 m. with grass. Through the numerous inlets which divide this beach the sea penetrates into the marshes, about 4 m. in width, and forms lagoons or salt-water lakes. In the N. part of the county is a similar marsh. Near Dennisville is a deposit

of cedar timber in the soil to an indefinite depth, which, though probably at least 2,000 years old, is still sound and valuable. The Cape May and Millville railroad traverses the county. The chief productions in 1870 were 19,064 bushels of wheat, 86,218 of Indian corn, 22,360 of Irish and 21,193 of sweet potatoes, and 7,954 tons of hay. There were 816 horses, 1,545 milch cows, 1,316 other cattle, and 1,751 swine. Capital, Cape May Court House.

CAPE MAY. I. The S. extremity of New Jersey, at the entrance of Delaware bay. On its S. W. point is a lighthouse. II. A town of Cape May co., N. J., occupying the above point of land, also called Cape City and Cape Island City, 70 m. S. S. E. of Philadelphia; pop. in 1870, 1,248. It is connected with Philadelphia by the West Jersey railroad, and in summer by several lines of steamboats. It is a noted summer resort, being the favorite watering place for Philadelphians. The beach is over 5 m. long, and affords splendid drives. The bathing facilities are unrivalled. There are numerous large and well appointed hotels, which with the cottages of visitors are situated on a small piece of land, about 250 acres in extent, known as Cape island, having formerly been separated by a small creek from the mainland. The principal place of resort in the vicinity is Cold Spring, 2 m. N. of the beach.

CAPE NAU (anc. *Lacinium Promontorium*), a headland of S. Italy, at the E. extremity of Calabria, once the site of a temple dedicated to Juno Lacinia. Hannibal is said to have embarked here on leaving Italy, 208 B. C.

CAPE NORTH, a promontory of Norway, at the N. extremity of the island of Magerø, which is the northernmost point of Europe; lat. $71^{\circ} 10'$ N., lon. $25^{\circ} 46'$ E. It consists of a long chain of precipitous rocks jutting out into the sea, about 1,200 ft. high, and crowned partly by a kind of table land, and partly by a number of pyramidal peaks.

CAPE NUN, *Noun*, or *Noun*, a headland on the W. coast of Morocco, in lat. $28^{\circ} 45'$ N., lon. $11^{\circ} 5'$ W. It extends into the sea at the S. W. extremity of the Atlas range, which has its N. E. termination in Cape dell' Acqua on the Mediterranean.

CAPE OF GOOD HOPE, or *Cape Peak*, a bold promontory rising nearly 1,000 ft. above the sea, at the S. point of a narrow peninsula 30 m. long, near the S. W. extremity of the continent of Africa, having the Atlantic ocean on the west and False bay on the east, 32 m. S. of Cape Town; lat. $34^{\circ} 22'$ S., lon. $18^{\circ} 29'$ E.

CAPE ORTEGAL, a rugged promontory forming the N. extremity of Spain, and extending into the bay of Biscay from the N. coast of the province of Coruña, in lat. $43^{\circ} 45'$ N., lon. $7^{\circ} 56'$ W. It is a part of the most barren and rugged stretch of the Spanish coast.

CAPE PALMAS, a headland of W. Africa, at the S. extremity of Liberia; lat. $4^{\circ} 22'$ N., lon. $7^{\circ} 44'$ W. It is surmounted by a lighthouse. In this portion of Liberia was founded

in 1834 the colony of Maryland-in-Liberia, consisting of free colored emigrants sent thither by the state colonization society of Maryland. Under the name of Maryland it now constitutes one of the states of the Liberian republic.

CAPE PRINCE OF WALES, a promontory on Behring sea, the most N. W. point of North America; lat. 66° N., lon. 168° W. It terminates in a peaked mountain, presenting a bold face to the sea, and is a dangerous point on account of a shoal which stretches toward the northeast.

CAPE, the flower bud of a low shrub (*capparis spinosa*), which grows on walls and ruins, or on rocks and accumulations of rubbish, in the south of Europe and the Levant. It is very common in Italy and in the southern parts of France. It grows wild upon the walls of Rome, Florence, and Siena, and is cultivated on a large scale between Marseilles and Toulon, and also in many parts of Italy. It begins to flower in the early part of summer, and flowers continuously until the commencement of winter. The buds are picked every morning before the petals are expanded, and are put into vinegar



Caper (*Capparis spinosa*).

as they are gathered. They are distributed according to their size into different vessels and prepared for the market; the youngest and the smallest, being most tender, are the first in quality; and hence the different sizes are placed in separate vinegar jars, denoting difference of quality and value. The stems of the caper bush are trailing and 2 or 3 ft. long. The leaves are alternate, ovate, veined, and of a bright green color. The flowers are white, large, and beautiful, with a tinge of red. They are divided into four petals, and from the centre of each flower springs a long tassel of deep lilac stamens. The brilliant blossoms give a very gay appearance to the plant.

CAPE RACE, a lofty and precipitous headland forming the S. E. extremity of Newfoundland,

and extending into the Atlantic from the southernmost point of the division of that island called Ferryland, in lat. $46^{\circ} 40' N.$, lon. $52^{\circ} 54' W.$ It forms a prominent point for navigators in the North Atlantic, lying near the ordinary route of vessels between the eastern ports of the United States and England, and being the last point of American land sighted or passed in the eastward passage.

CAPERCAILZIE. See **GROUSE.**

CAPE RIVER, or **Vamks** (called also, from a small town near its source, Rio de Segovia), a river of Central America, forming the boundary between Nicaragua and the state of Olancho in Honduras. It flows through a fertile country, and after a course of 250 or 300 m., enters the Caribbean sea at Cape Gracias á Dios. It is navigable for a considerable distance from the sea, but the upper part of its course is obstructed by cataracts and shallows.

CAPERNAUM, a town of Palestine, often mentioned in the New Testament, and memorable as the scene of many of the works of Jesus. The town seems to have been on the W. coast of the sea of Gennesareth; but travellers differ as to its exact locality. A long series of traditions identified it with a ruined village, known



Ruins of Synagogue at Tell Hum.

at present as Khan Minyeh, until the 17th century; since then it has generally been fixed at Tell Hum, a spot further N. on the seacoast. Dr. Robinson inclines to restore the ancient tradition, while Capt. Wilson, the latest explorer, decides in favor of Tell Hum.

CAPEERS, William, D. D., an American Methodist clergyman, born in St. Thomas's parish, S. C., Jan. 26, 1790, died at Anderson, S. C., Jan. 29, 1855. In 1808 he was received into the South Carolina conference, filling some of the most important stations in its bounds. In 1821 he was appointed missionary to the Indians in western Georgia, and travelled throughout the state pleading the cause of missions. The year following he established a mission among the Creek Indians on Flint

river. In 1825 he was stationed in Charleston, where he remained as preacher in charge and presiding elder for six years. For a part of this time he edited the "Wesleyan Journal," which was subsequently merged in the "Zion's Herald," and now bears the name of the "Christian Advocate and Journal" in New York. In 1828 he was chosen as representative to the Wesleyan Conference in England. In 1835 he was elected professor of the evidences of Christianity in the university of South Carolina, a post which he afterward resigned to take charge of the "Southern Christian Advocate," which he edited for five years. At the first general conference of the M. E. church, South, he was elected and consecrated bishop (1846), which office he filled until his death.

CAPE SABLE. I. A rocky point forming the S. extremity of Nova Scotia, in the county of Shelburne, extending into the Atlantic in lat. $43^{\circ} 26' N.$, lon. $65^{\circ} 38' W.$ II. The most S. point of the mainland of Florida, and the S. E. extremity of the mainland of the United States, in lat. $26^{\circ} 55' N.$, lon. $81^{\circ} 15' W.$ Fort Pointsett is situated upon it. The cape is low and sandy, and to the north of it is the western extremity of the great Mangrove swamp.

CAPE SAN LUCAS, the S. extremity of the peninsula of California, extending between the gulf of California and the Pacific ocean in lat. $22^{\circ} 44' N.$, lon. $109^{\circ} 54' W.$ It forms one side of a bay on which lies the town of St. Joseph, about 20 m. east of the cape.

CAPE SAN ROQUE, a promontory on the N. E. coast of Brazil, forming the N. E. extremity of the province of Rio Grande do Norte, extending into the Atlantic in lat. $5^{\circ} 28' S.$, lon. $35^{\circ} 16' W.$ At this cape the coast turns from its general direction (N. and S.) so sharply to the west as to form almost a right angle; thus making the promontory the most prominent projection on the eastern shore of the continent. About 50 m. S. of it is the harbor of Natal.

CAPE SPARTIVENTO (anc. *Herculis Promontorium*), a promontory of southern Italy, forming the S. E. extremity of Calabria Ultra, extending into the Mediterranean in lat. $37^{\circ} 57' N.$, lon. $16^{\circ} 5' E.$ Many of the ancients considered it the southernmost point of Italy, and Strabo always so describes it; but the majority appear to have held Cape Leucopetra (the modern Capo dell' Armi) to be further S. The extreme point is in reality about midway between the two.

CAPE ST. VINCENT (anc. *Promontorium Sacrum*), a headland at the S. W. extremity of Portugal. Off this cape, Feb. 14, 1797, an English naval force, consisting of 15 ships of the line, under Admiral Jervis, defeated a more numerous Spanish fleet.

CAPET, an appellation given to Hugues, or Hugh, the first king of the third French dynasty. That the name comes in some way from the Latin *caput*, head, is certain. Some suppose it to have indicated that Hugh had

a little head; others that he had a big head; others that he was "heady," or self-willed; while others suppose that the name came from the *capa*, or hooded cope, which he was accustomed to wear. The name Capet was officially assigned to Louis XVI. after the insurrection of Aug. 10, 1792, in accordance with the law which ordered that all nobles should give up their feudal designation, and be known by the original name of their family.

CAPETIANS, the third race of French kings, beginning with Hugh Capet (987). The origin of the Capets is usually traced back to Robert the Strong, a warrior of Saxon descent, who held in fief from Charles the Bald the county of Anjou and afterward the duchy of Ile-de-France. He gained great popularity by his struggles against the Norman pirates who invaded France during the 9th century. Three of his descendants, Eudes, Robert, and Raoul, assumed the title of king in competition with the Carlovingian princes; but the crown was not firmly established in this family until the election of Hugh Capet. This appears to have been a kind of national protest on the part of the Gallo-French population against the descendants of Charlemagne, who then depended on German princes. The Capetians, several of whom were distinguished as able politicians or great warriors, strengthened their position by close alliance with the clergy, and the assistance they received from the *communes*, or municipal cities. They were 15 in number, and reigned from 987 to 1828, as follows: Hugh Capet, 987-'96; Robert II., the Pious, 996-1031; Henry I., 1031-'60; Philip I., 1060-1108; Louis VI., the

Fat, 1108-'37; Louis VII., 1137-'80; Philip Augustus, 1180-1223; Louis VIII., 1223-'26; Louis IX., or Saint Louis, 1226-'70; Philip III., the Bold, 1270-'85; Philip IV., the Fair, 1285-1314; Louis X., the Quarrelsome, 1314-'16; John I., 1316, a posthumous child, who died at the age of 8 days, and is therefore generally omitted from the list of French kings; Philip V., the Long, 1316-'22; Charles IV., the Fair, 1322-'28. From this main stock issued several collateral branches, the most important of which are the following: Robert, the grandson of Hugh Capet and brother of Henry I., in 1032 founded the first ducal house of Burgundy, which became extinct in 1361; Pierre, the eighth son of Louis VI., married Isabella de Courtenai, and had three descendants who reigned at Constantinople during the 13th century; Charles, count of Anjou, the eighth brother of St. Louis, was the head of the first house of Anjou, which held the kingdom of Naples from 1266 to 1882. The sixth son of the holy king, Robert, count of Clermont, was the head of the house of Bourbon, which succeeded to the French throne in 1589; while his grandson, Charles, the brother of Philip the Fair, founded the house of Valois, which came into possession of the crown on the extinction of the direct Capetian line.

CAPE TOWN, the capital of Cape Colony, S. Africa, situated at the bottom of Table bay, and at the foot of Table mountain, lat. 33° 55' S., lon. 18° 28' E., about 32 m. N. of the Cape of Good Hope; pop. in 1865, 28,457, of whom two thirds were whites. It is the seat of an Anglican bishop, who is the metropolitan of the



Cape Town, from Table Bay.

dioceses of S. Africa, and also of a Roman Catholic bishop. The town is well built and well laid out. There is a fortress near it of considerable strength. Table bay is capacious, but the anchorage is rendered uncertain by the heavy swell of the Atlantic. Cape Town is a station for astronomical observations, and Sir John Herschel passed two years at this place for the purpose of studying the heavens of the southern hemisphere. The chief public buildings are the government house, the colonial

office, the barracks, the exchange, the post office, the public library, three Anglican and four English dissenting churches, a Dutch Reformed church capable of holding 2,000 persons, and a handsome Roman Catholic church. The streets are laid out at right angles. Most of the houses are built of brick, faced with stucco. There is a capacious public walk between the gardens of the government house and the botanical garden.

CAPE TRAFALGAR. See TRAFALGAR.

CAPE VERD, the most westerly cape of the W. coast of Africa, between the rivers Senegal and Gambia; lat. $14^{\circ} 43'$ N., lon. $17^{\circ} 34'$ W. It was discovered in 1446 by the Portuguese navigator Diniz Fernandez.

CAPE VERD ISLANDS, a Portuguese colony situated in the Atlantic ocean, 320 m. W. of Cape Verd, between lat. $14^{\circ} 45'$ and $17^{\circ} 18'$ N., and lon. $22^{\circ} 45'$ and $25^{\circ} 25'$ W.; area, about 1,650 sq. m.; pop. in 1869, 70,164. The islands are of volcanic origin, and a volcano still exists on the island of Fogo. The shores are low, but in the interior there are high mountains. The archipelago consists of the following 14 islands: Sal, Boavista, Mayo, Santiago, Fogo, Brava, Grande, Rombo, São Nicolao, Santa Luzia, Branco, Razo, São Vicente, and Santo Antonio. The soil is dry but fertile. The heat of the sun is great, but the climate is tempered by the sea breezes. The rainy season lasts from the middle of August to November, and is unhealthy for Europeans. There is a great want of water and trees. Sometimes no rain falls for several seasons, and then the distress of the inhabitants is extreme. In 1832, after a three years' drought, 30,000 people perished. All the fruits of S. Europe and W. Africa flourish here, particularly oranges, lemons, melons, and bananas; so do rice, maize, wine, sugar, archil, cotton, and French beans. Coffee was introduced in 1790. Indigo grows wild. Goats and fowls are very numerous; goat skins are a principal article of export. Asses are reared and exported to the West Indies. The most remarkable of the wild animals are monkeys and bisam cats; venomous reptiles are unknown; whales are found in the neighboring seas, and turtles frequent the coasts. Salt is manufactured and exported to North America. In 1871 the entries at Santiago, the principal port, were 55 steamers of 47,688 tons, and 199 sailing vessels of 19,401 tons; most of the steamers were Portuguese, bound to the W. coast of Africa.—The natives are docile, indolent, and very religious. The Roman Catholic is the only form of worship. Mulattoes, a cross between Portuguese and negroes; form the next most numerous race. The whites constitute about one twentieth part of the population, the slaves one seventh. The language is corrupted Portuguese, which the Portuguese call *lingua creoula*. As the sea between the continent and the islands is beset with haze and fogs during the greater part of the year, ships sailing southward generally steer outside of the Cape Verd islands. The inhabitants have some commerce with Africa. The most considerable island of the group is Santiago, about 50 m. long and 23 broad in its widest part; pop. about 22,000. The governor resides at Porto Praya, a fortified seaport town on this island, with about 2,000 inhabitants. In 1870 the garrison on the islands consisted of two companies of artillery. The volcano of Fogo rises to the height of 9,157 ft. The islands were discovered about 1450 by the Portuguese,

in whose uninterrupted possession they have ever since remained.

CAPE VINCENT, a township and port of entry of Jefferson co., N. Y.; pop. of the township in 1870, 3,342; of the village, 1,269. The township borders on the St. Lawrence and Lake Ontario; and the village is situated on the St. Lawrence, opposite Kingston, Canada, at the terminus of the Rome and Watertown railroad, and has a steamboat landing and a ship yard.

CAPIAS (Lat. *capio*, to take), a name given to several species of judicial writs, the command of which to the officer is that he take the person against whom they are directed into custody for a purpose specified. The principal of these are the *capias ad respondendum*, which issues at the commencement of a suit, and commands the officer to take the defendant into custody to answer the plaintiff's action, and the *capias ad satisfaciendum*, which commands the body of a party to be taken and detained in custody to satisfy a judgment rendered against him. Besides the writs against the person, there is also the *capias in withernam*, which directs the sheriff to take goods of a distrainer equal in value to those which he had distrained wrongfully, and removed from the county or concealed so that they could not be taken on process. The *capias utlagatum*, formerly issued for the arrest of an outlaw, also sometimes contained a special command that the goods of the outlaw be taken.

CAPILLARY ACTION (Lat. *capillus*, a hair), a manifestation of the force of adhesion shown by the movement of a fluid upon a solid surface placed partly within the fluid. It is called capillary because it is most striking on the inside of very small (capillary or hair-like) tubes. If the solid can be wet by the fluid, the fluid will rise in the tube, or on any surface, as water on glass or wood. If the solid cannot be wet by the fluid, the fluid will be depressed in the tube, as quicksilver is depressed in a glass tube. Capillary action has been investigated with great care, both by experiment and calculation, but its interest is chiefly theoretical, its practical uses and laws being obvious.—See Laplace's *Mécanique céleste*, vol. iii.

CAPILLARY VESSELS (Lat. *capillaris*, hair-like), the small vessels intermediate between the arteries and the veins; so called from their minute size, and from the fact that they are all of nearly unvarying diameter, as compared with the larger vessels. The capillary blood vessels are composed of a delicate, transparent, elastic tubular membrane, marked at various points with small oval spots termed nuclei. Their average diameter in the human subject is about $\frac{1}{1000}$ of an inch. They inosculate with each other very abundantly, making numerous communications in every direction at very short intervals, and form in this way what is known as the capillary plexus or network. In some organs, as in the lungs, these communications

are so abundant that the interspaces between the vessels are hardly so extensive, when taken together, as the capillaries themselves. This frequent intercommunication and inoculation of the capillary vessels is their most important characteristic as distinguished from the arteries and the veins. For while the arteries constantly divide and separate from each other so as to convey the blood to separate organs, and the veins unite into larger branches and trunks in order to collect the blood from the different organs and return it to the heart, the capillaries, on the other hand, are so arranged as to disseminate the blood in a multitude of minute streams through the substance of an organ, and thus to bring it into intimate contact with its tissue. This form of the capillary plexus varies in different parts. In the cellular tissue the meshes are irregular in shape; in the muscles they are oblong, in the papillæ of the skin and tongue they are arranged in loops, in the Malpighian bodies of the kidney they form convoluted globular tufts, and in the glandular organs they surround the secreting follicles with a vascular network. In all cases the capillary vessels receive their blood from the arteries and deliver it into the veins. The only apparent exception to this is in the capillary plexus of the liver, which is supplied with blood in great part from the portal vein, which has already collected it from the capillary system of the stomach and intestines. The liver, however, is also supplied with blood by the hepatic artery, and even the blood of the portal vein, though immediately derived from the capillaries of the alimentary canal, was yet first transmitted from the arteries of these organs.

CAPISTRANUS, Johannes, an Italian monk, born at Capistrano, in the Abruzzi, June 24, 1386, died near Belgrade, Oct. 23, 1456. Having acquired distinction as a juriconsult, he was employed in the service of the king of Sicily; but his wife dying, he gave away all his property, entered upon an ecclesiastical life as a disciple of St. Bernardin of Siena, and became one of the most eloquent preachers of his time. He was for about six years vicar general of the order of Observants, employed by successive popes against heretical sects, and acted as nuncio in Sicily and at the council of Florence for the reunion of the Latin and Greek churches. At the request of the emperor Frederick III. he was sent by the pope in 1451 on a preaching crusade against the Hussites; and though he spoke in Latin, an interpreter conveying his meaning in German, immense crowds listened to him. In 1453 he went to Breslau, where he established a convent, and exerted great religious influence. In the other cities of Germany his visits became likewise the signal for great excitement, and King Casimir IV. invited him to preach in Poland. He instituted cruel persecutions of the Jews in Silesia and Poland. But his most marked achievement was the crusade against the Turks. Having failed to secure the sup-

port of the imperial diet and of the German princes, he appealed to the people, and succeeded in enlisting 40,000 men, of whom Pope Calixtus III. made him chief. He effected a junction with Hunyady, and aided him in driving the Turks from Belgrade, in July, 1456; he was foremost in the fight with the cross in his hand, and died soon after from a fever contracted on the battle field. His tomb became a resort of pilgrims, and he was regarded as a saint who had worked miracles. He was beatified in 1690, and canonized in 1724, his anniversary being Oct. 23.

CAPITAL PUNISHMENT (Lat. *caput*, head, the source of life; hence *capitalis*, anything affecting life, as *crimen capitale*, capital crime; *pœna capitalis*, capital punishment), in modern law, the punishment of death. A capital offence by the Roman law imported only a loss of civil rights (*amissio civitatis*). In the primitive state of social organization, at least in the earliest condition of which we have any record, retaliation was the common method of punishing offences, and this was inflicted by the individual suffering the injury, or by his friends when the injury was loss of life. The right of individual revenge has not only existed in the savage state, but has been recognized, and to some extent tolerated, even after laws have been enacted for the restraint of crime; and in the laws of many nations, retaliation, that is, the infliction of the same injury upon the offender which he had committed, was allowed. Moses prescribed, as the measure of punishment for corporal injuries, an eye for an eye, a tooth for a tooth, and life for life (Exod. xxi.; Levit. xxiv.); and it would seem, in the latter case, that any person belonging to the family of the person whose life had been taken could pursue the murderer and slay him. "The avenger of blood" was a person having such right of private vengeance, and not a public officer appointed for that purpose. The only means of escape from this mode of retribution was by fleeing to certain cities of refuge, and this was available only in cases of what we should call excusable homicide.—The offences designated by the laws of different nations as punishable by death are illustrative of the degree and peculiar form of civilization. The Hebrew polity being theocratic, many offences were punished capitally as being violations of the national faith, such as desecration of the sabbath, blasphemy, idolatry, witchcraft, cursing, offering children to Moloch, and disobedience to parents. Murder, adultery, incest, kidnapping a free person and selling him for a slave, and some other offences, were also capital.—The Athenian code of laws established by Draco prescribed the punishment of death for a large number of offences, greatly differing in degrees of criminality, which the lawgiver extenuated by saying that the smallest of the crimes specified deserved death, and there was no greater penalty which he could inflict for more heinous offences. This severity was

afterward very much modified, and the Athenian criminal code became very mild, but subject to an arbitrary power reserved to the assembly of the people over the lives of all the citizens, and also to a discretion, which in many instances was left to the areopagus, and even to the dicasts of the people, of determining the punishment as well as the guilt of the accused; as in the case of Socrates, who, after trial by the court of areopagus, and being convicted of the charge against him, was retried with reference to the punishment. It was generally in the power of an Athenian to escape from a trial, if he was unwilling to incur the risk, by going into voluntary exile. Arrest before trial was not the practice in judicial proceedings, either civil or criminal, in the Athenian courts. The crimes ordinarily punished by death, or for which death was prescribed by law, were sacrilege, impiety (any open disrespect for religious rites or popular faith), treason, murder, or the attempt to murder, and incendiarism. There may have been other cases, but we have no record of them. The charge against Alcibiades, which drove him into exile, was the mutilation of the busts of Hermes which had been placed in the streets of Athens. Socrates was accused of spreading disbelief in the national religion. Although the judgment of the areopagus in the case of Socrates was unjust, yet the ordinary administration of justice by that court was impartial and lenient.—The Roman laws compiled by the decemvirs were severe. The *lex talionis*, or punishment like to the injury, was admitted in cases of maiming or other corporal violence; but exemption could be obtained by a pecuniary compensation. Montesquieu mentions the singular provision by which the penalty of death was denounced against the writers of libels and poets, as showing that the laws were framed for the support of a despotic government. The severity of the twelve tables, into which the laws were digested by the decemvirs, was prevented from having full operation by the Valerian laws, which had been previously passed in the consulship of Valerius Poplicola, taking from the consuls the power of inflicting the punishment of death, and giving an appeal from the consul to the people in all cases; and finally by the Porcian law, A. U. 454, forbidding any one to bind, scourge, or kill a Roman citizen. Criminal jurisdiction in capital cases was therefore vested in the assembly of the people. Trials were always had in those cases before the *comitia centuriata*. The same usage prevailed at Rome which existed at Athens, viz.: of allowing a criminal accused of a capital crime to go into voluntary exile, and thus avoid the judgment of the court; but in such cases his property could be confiscated for non-appearance.—The Germans in their primitive state allowed private retaliation for injuries, and long after they had become established as nations within the territory of the Roman empire, and had become subject to codes of laws,

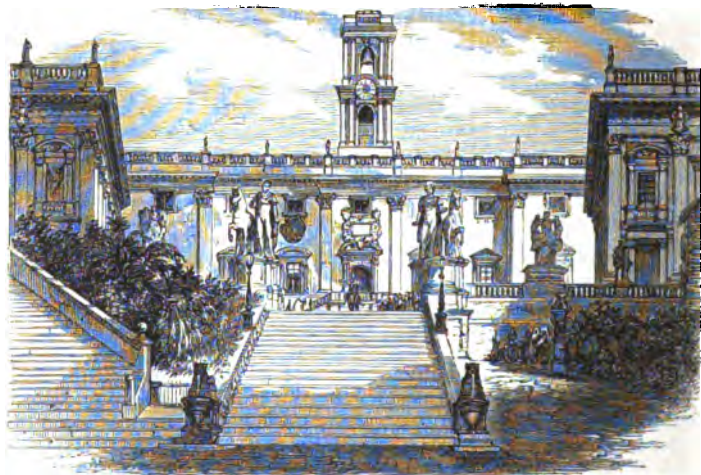
this was still considered a natural right, and judicial authority interposed no check except to impose terms of compromise when the injured party was willing to accept pecuniary compensation. The Salic law prescribed the rate of composition for different crimes, which was called *wehrgeld*, composition money (from *wehren* or *bewahren*). It was, however, assumed that the injured party had a right to choose whether to take the composition, or to get satisfaction by his own hand. Similar provisions are found in the laws of the Burgundians, Visigoths, and Ripuarian Franks. The Anglo-Saxons, like the other German nations, had a scale of fines for every species of crime; that for murder was called *moigbota* or *manbote*. (See ANGLO-SAXONS.) Besides paying the relations of the deceased, a murderer was also obliged to make compensation to the master if the deceased was a slave, or to the lord if the deceased was a vassal under his protection. It was common for the poorer class to enroll themselves as the retainers of some superior, who was then bound to protect them. Associations were also formed among men of the same class for their mutual protection, the obligation assumed being to pursue the murderer of any one belonging to the association, and inflict punishment.—In England there was during a long period a serious interference with the regular administration of criminal justice, growing out of the exemption claimed by and conceded to the church in behalf of the clergy and their retainers. (See BENEFIT OF CLERGY.) It became usual, therefore, to incorporate in statutes a prohibition of the benefit of clergy where it was intended that the death penalty should be inflicted. At the time Blackstone wrote there were 160 different offences which had been declared felonies without benefit of clergy, and might be visited with that penalty; but gradually the fearful list has been reduced to the crimes of treason and murder, regarded as the two most heinous. By the laws of the United States the crimes punishable by death are treason, murder, arson, rape, piracy, robbery of the mail with jeopardy to the life of the person in charge thereof, rescue of a person convicted of a capital crime when going to execution, burning a vessel of war, and corruptly casting away or destroying a vessel belonging to private owners. Treason and murder are capital crimes in most of the states; in some also rape, arson, and robbery under aggravated circumstances; but some have abolished capital punishment altogether. Aggravated military offences, such as acting as a spy, desertion to the enemy or secretly communicating advice or intelligence to him, are punishable with death in all countries. In England, Scotland, Ireland, Austria, and the United States the punishment is by hanging, in France by the guillotine, in Spain by the garrote, and in most of the other European states by beheading, which was the method employed formerly in England. The military punishment is by shoot-

ing, or, in case of crimes considered peculiarly dishonorable, by hanging.

CAPITANATA, province of Italy. See FOGGIA.
CAPITOL (Lat. *Capitolinus*) and **Capitoline Hill** (*Mons Capitolinus*), the temple of Jupiter Optimus Maximus in ancient Rome, and the hill on which it stood, and which from it received its name. The latter is an irregular oblong with two more elevated summits, on the southern of which the temple was erected. The hill was wholly consecrated to Jupiter, except a nook which was reserved for the god Terminus, who refused to leave the spot when the other gods left out of deference to Jupiter. At the steeper northern summit was the citadel (*Arx*), built in the earliest period of Roman history. The first foundations of the Capitol were laid by Tarquinius Priscus, but the edifice was not finished till shortly after the expulsion of the kings. It was destroyed by fire in 83 B. C.; was rebuilt by Sulla, and dedicated by Q. Catulus in 69; and was again burnt in A. D. 69 by the soldiers of Vitellius, and rebuilt by Vespasian. In the reign of Titus it was burnt a third time, A. D. 80, but Domitian restored it with great magnificence. It contained three shrines, consecrated respectively to Jupiter, Juno, and Minerva. The form of the Capitol was nearly a square, being 200 ft. long and 185 ft. broad. In the piazza or portico the people were feasted on triumphal occasions. The victorious generals went up there in procession to offer thanks and sacrifice. The Sibylline books and the most important public documents were deposited there. Other temples were one by one raised on the Capitoline hill. Among these, the temples of Juno Moneta, with the mint attached, of Jupiter Fere-

on the hill. At the S. end was the Tarpeian rock, down which state criminals were thrown headlong.—The top of the Capitoline hill now forms the piazza del Campidoglio, surrounded on three sides by palaces, built or altered from designs by Michel Angelo. On the N. side is the palace of the senator, on the W. the palace of the conservators, and on the E. the museum of the Capitol. The ascent to the piazza is by a broad flight of steps, at the foot of which are two Egyptian lions, and in the angles of the balustrades at the summit are colossal statues of Castor and Pollux standing by their horses. Near by is a collection of marble sculptures formerly supposed to be the trophies of Marius, but now assigned to the age of Domitian, and the ancient milestone which marked the first mile of the Appian way. In the centre of the piazza is a bronze equestrian statue of Marcus Aurelius, one of the finest ancient works of the kind; the horse is especially good. There are also the statue of Minerva, commonly called "Rome Triumphant," and colossal figures of the Nile and the Tiber. The palaces contain innumerable objects of great artistic or historical interest. On the first floor of the palace of the senator are several statues; the second floor is mainly occupied as the offices of the municipality and the police courts; above is the astronomical observatory, and the tower, which affords the finest view of Rome and its environs. In the palace of the conservators are halls containing busts of eminent Italians, the gallery of pictures, and many ancient statues and fragments of sculpture: the famous "Bronze Wolf;" the *Fasti Consulares*, or list of names of the Roman consuls and magistrates to the time of Augustus; and

Michel Angelo's restoration of the Duilian column, erected in 260 B. C., with what remains of the original inscription, probably the oldest extant Roman inscription. In the picture gallery are several paintings by eminent artists, the masterpiece being Guercino's "Santa Petronilla." There are in all about 230 paintings, but only a few are of superior merit. In the palace of the museum is a fine sarcophagus with bass reliefs representing the story of Achilles; it was exhumed from a tumulus which contained the celebrated Portland



The Modern Capitol at Rome.

trius, of Mars, of Venus, of Fortune, and of Isis and Serapis were the most considerable. A *bibliotheca* or library, the tabularium, æthe-næum, and other public buildings were also

vase, in which were the ashes of the person to whom the tomb was erected. There are also fragments of the *Pianta Capitolina*, or ground plan of ancient Rome, engraved upon

marble; the famous statue of the "Dying Gladiator;" the "Antinous of the Capitol," found in Hadrian's villa, one of the most perfect statues in existence; the "Faun" of Praxiteles, finer than that in the Vatican; the "Faun" in *rosso antico*, notable for the rarity of the material and its fine sculpture; and a sarcophagus with bass-reliefs of the battle of Theseus and the Amazons, containing one group which Flaxman pronounces among the best specimens of ancient reliefs. In the hall of illustrious men are 93 busts of famous Greeks and Romans, many of them of doubtful authenticity. In the hall of the emperors, besides numerous bass-reliefs, is a series of 83 busts of emperors and empresses. The hall of the doves contains an exquisite mosaic, representing four doves drinking, formed of pieces of natural stone so small that 160 are contained in a single square inch. In the "reserved cabinet," not open on public days, is the famous "Venus of the Capitol," which was found walled up in a chamber so carefully that the only parts fractured were the point of the nose and one of the fingers.

CAPITOLINE GAMES (*ludi Capitolini*), annual games instituted on the suggestion of Camillus, 387 B. C., in honor of Jupiter Capitolinus, and in commemoration of the preservation of the Capitol from the Gauls. One of the amusements at these games was to offer the Sardinians for sale by auction. These Sardinians are by some supposed to have been Sardinians, and by others Veiians. The games fell into disuse, and were revived by Nero, who modelled them after the Olympic games, and endeavored to introduce a new method of computation of time, reckoned, like the Olympiads of Hellenic chronology, from the quinquennial celebration of the *ludi Capitolini*.

CAPITOLINUS, Julius, a Roman historian, who lived toward the end of the 3d century, and wrote the lives of nine emperors. He is one of the writers of the *Historia Augusta*, in the editions of whom his works are to be found.

CAPITULATION. I. In war, the act of surrendering to the enemy upon stipulated terms. Among the most remarkable capitulations recorded in history are those which took place during the last ten years: of Vicksburg, July 4, 1863, when 27,000 confederates, under Gen. Pemberton, surrendered to Gen. Grant; of Appomattox Court House, April 9, 1865, when Gen. Lee, with 28,000 confederates, surrendered to Gen. Grant; of Raleigh, April 26, 1865, when the confederate force under Gen. J. E. Johnston, upward of 80,000 strong, surrendered to Gen. Sherman; of Sedan, Sept. 2, 1870, when Napoleon III., with 83,000 men, 70 mitrailleuses, 400 field pieces, and 150 fortress guns, surrendered to the Germans; of Metz, Oct. 27, 1870, when the French under Marshal Bazaine, 173,000 men, 66 mitrailleuses, 541 cannon, and 53 eagles, surrendered to the Germans. II. A reduction into heads or articles; in German constitutional history, applied to a contract which the

German electoral princes entered into with the German emperor, before he was raised to the imperial dignity. The first of these capitulations was exacted from Charles V. in 1519, by the German princes who feared that the king of Spain would not respect the limitations put upon him by the constitution of the German empire. They accordingly drew up a capitulation, reciting the privileges they demanded, to the observance of which Charles V. was compelled to swear. The last of these imperial capitulations was sworn to by the emperor Francis II., July 5, 1792.

CAPITULARIES, certain laws enacted under the Frankish kings, and so named from the circumstance of their being divided into *capitula*, or chapters. They were issued by Childebert, Clothaire, Carloman, and Pepin, but still more extensively by Charlemagne, whose object appears to have been to harmonize, explain, or amend the existing feudal codes, and effect to some degree a uniformity of law in his dominions. These enactments were both civil and ecclesiastical; according to Savigny, the latter were of force throughout the three kingdoms subject to the race of Charlemagne, but the former were valid only within the state in which they originated. The capitularies were promulgated in the public assemblies, composed in Charlemagne's day of the sovereign and chief clerical and lay dignitaries, though in earlier times all those capable of bearing arms seem to have taken part in them. The laws were inscribed among the royal archives in the Latin tongue, and published to the people in the vernacular. Their execution was intrusted to the bishops, the courts, and the officers called *missi regii*, who were sent under the French kings of the first and second race to administer justice in the provinces. The earliest enactment coming under the name of capitulary was made by Childebert in 554, and the latest by Charles the Simple, who died in 929. The first collection of the capitularies was begun in 827 by Ansegisus, abbot of Fontenelle, and continued by Benedict the Deacon, of Mentz. It was approved by various kings and councils, and had the force of law. Additions were subsequently made to this collection, and the first complete edition was published by Vitus Amerpachius at Ingolstadt in 1545, under the title of *Præcipua Constitutiones Caroli Magni de Rebus ecclesiasticis et civilibus*. The best edition is that of Baluze, entitled *Capitularia Regum Francorum*, &c. (2 vols. fol., Paris, 1677; new eds., Venice, 1771, and Paris, 1780).

CAPIZ, a town of the Philippine islands, capital of a province of the same name in the island of Panay, situated in a plain near the sea, and surrounded by three rivers, the Panay, Panitan, and Ivisan; pop. 12,000. Some of the houses are constructed of stone, others of nipa palm. The town is defended by a small fort and garrison; it is sometimes inundated in the rainy season. The inhabitants divide their attention between commerce and fishing.

CAPMANY Y MONTPALAU, Antonio de, a Spanish writer, born in Barcelona, Nov. 24, 1742, died in Cadiz, Nov. 14, 1818. He served in the wars with Portugal in 1762, left the army in 1770, and joined Olavide in his scheme for colonizing and cultivating the Sierra Morena with Catalans. This enterprise terminated disastrously, and Capmany removed to Madrid. He was chosen secretary of the royal historical academy in 1790, filled several offices in the gift of the government, and travelled in Italy, Germany, France, and England. When the French entered Madrid in 1808, he fled to Seville, and joined the insurrection in defence of Spanish independence. He was chosen a member of the cortes of Cadiz, in which capacity he made himself conspicuous by his patriotism and active opposition to the usurpers. His works, which enjoy a high reputation in Spain, are numerous; among them are *Memorias historicas sobre la marina, comercio y artes de la antigua ciudad de Barcelona* (8 vols. 4to); *Cuestiones criticas sobre varios puntos de historia, economica, politica y militar*; *Teatro historico-critico de la elocuencia española*; and *Diccionario frances-español*. His work on Barcelona contains valuable details upon the commerce, industry, and maritime law of the middle ages.

CAPOCCI DI BELMONTE, Ernesto, an Italian astronomer, born at Picinisco, March 28, 1798. He was early employed in the observatory of Naples, under the direction of his uncle, the chevalier Luccari, and that of his successors. His labors relating to the orbits of new comets and spots on the sun were regarded as very valuable. For Encke's celestial atlas he prepared (1839-'42) the difficult description of the 18th hour of the heavens, for which he received the acknowledgments of the academy of Berlin. He was appointed director of the observatory of Naples, but lost the place on account of his sympathy with the liberal movement, as a member of the Italian parliament (1848-'9). He was reinstated in his position after the establishment of the kingdom of Italy, and named senator, but has since retired. He wrote a historical novel, *Le premier vice-roi de Naples* (Paris, 1888).

CAPO D'ISTRIA, a town of Istria, Austria, in a district of the same name, 8 m. S. S. E. of Trieste; pop. in 1869, 9,169. It occupies a nearly circular island, which is connected with the mainland by a stone causeway, built by the French in place of a former wooden bridge. The buildings are chiefly of a Venetian character, the most notable being the *palazzo pubblico*, built in an irregular Gothic style upon the site of an ancient temple of Cybele. The city has a good harbor, a cathedral, about 30 churches, two convents, an academy and gymnasium, an aqueduct, and extensive salt works. It is said to have been founded by the Colchians, under the name of *Ægida*. In the 6th century many wealthy families sought a refuge there from the Lombards and Avars. Having been conquered

by the emperor Justinian I., it was named by him Justinopolis, in honor of his uncle Justin I. Later it became an independent commonwealth; was annexed to Venice in 992; conquered by the Genoese in 1380; fell again under Venetian supremacy about 100 years later; and was annexed to Austria in 1797.

CAPO D'ISTRIA, or *Capodistria*, a noble family connected with the early history of the modern Greek kingdom. **I. John Anthony**, count of Capo d'Istria, born in Corfu about 1780, assassinated at Nauplia, Oct. 9, 1881. He was educated for a physician, but entered upon a political career. When the Ionian Islands became a vassal state of Turkey, under British and Russian protection, Capo d'Istria filled several public stations, from 1802 to 1807. The islands having been returned to France by the treaty of Tilsit, he accepted a place in the Russian ministry of foreign affairs, and was employed in many diplomatic missions. In 1816 he was appointed secretary of foreign affairs in Russia. In 1819 he visited his native country in order to sound the popular feeling. The results of his visit were stated by him in a pamphlet, in which he endeavored to demonstrate that it was the province of absolute governments to educate the people for the enjoyment of freedom. This doctrine was not palatable to the leaders of the Greek insurrection, and the movement begun by them in 1821 was disavowed by Russia. Capo d'Istria lost his office in 1822, and went to Switzerland, where he succeeded in regaining the confidence of the Greek leaders. With the consent of the British ministry and the Russian government, he was elected president or regent of Greece by the national convention assembled at Damala in 1827. Before assuming the government he went to St. Petersburg, where, it is generally believed, he received secret instructions from the Russian government. He landed at Nauplia in January, 1828, and for a very short time commanded the confidence of the people; but instead of fulfilling his pledge to form a great national army and repulse the Turkish army under Ibrahim Pasha, he left the defence of the country to foreign diplomacy, promulgated a code of laws of the utmost severity, opposed the election of Prince Leopold of Saxe-Coburg to the throne of Greece, and seemed to have no other object in view except to prepare Greece for Russian annexation. The island of Hydra became the seat of a violent opposition against his measures as early as 1829. In consequence of the French revolution of 1830, insurrectionary movements broke out which only Russian assistance enabled him to suppress. But at last he was stabbed by the brothers Constantine and George Mavromichalis, as he was entering the church of St. Spiridion. **II. Vlaro**, eldest brother of the preceding, died in 1842. He was originally a jurist in Corfu, and in 1828 became a member of the Panhellenic organization, in the department of war and the marine, and was soon after appointed governor of the western Spor-

des, where he became obnoxious to the people, who called him Viano Pasha. Nevertheless his brother intrusted him with the formation of a new code of laws. In 1831, in consequence of the popular feeling against him, he was removed from office. **III. Augustine**, brother of the preceding, born in 1778, died in Corfu in 1857. He was appointed by his brother military and political chief of continental Greece in 1829. Two of the foremost leaders, Gen. Church and Demetrius Ypsilanti, absolutely refused to recognize his authority. After the assassination of his brother he assumed the government as chairman of the board of regency, and was elected president by the national convention assembled at Argos in December, 1831. The Russian government assured him of its sympathies, and he was recognized by the London conference of the allied powers. A few weeks later the opposition became so powerful that the great powers retracted their former action and compelled him to resign. He left Greece for St. Petersburg, April 18, 1832, taking the corpse of his brother with him.

CAPPADOCIA, an ancient division of Asia Minor, in the east of that peninsula, between the Taurus, which separated it from Cilicia, and the Euxine, and the middle Halys and the upper Euphrates. It was traversed by the Anti-Taurus, and watered, besides the rivers mentioned, by the Melas, the Sarus, and the Pyramus. It was inhabited by a sturdy people of Semitic race, often designated as White Syrians. It was conquered by the Persians under Cyrus. After the era of Alexander the Great and his immediate successors it was ruled by independent kings till A. D. 17, when it was reduced to a Roman province by Tiberius. Christianity was early introduced into Cappadocia, as we learn by the First Epistle of St. Peter. Under the Persians or Macedonians the province was divided into two parts, Cappadocia ad Pontum, or simply Pontus, in the north, and Cappadocia ad Taurum, called afterward by the Romans Cappadocia Magna, also Cappadocia simply. The chief town of the latter was Mazaca, afterward Cæsarea, and the country was celebrated for its fine pastures and its superior breed of horses, mules, and sheep. Cappadocia shared the fate of the Eastern empire until it fell into the power of the Turks, in whose possession it still remains, forming part of several modern eyalets of Asiatic Turkey.

CAPPE, Newcome, an English clergyman, born in Leeds, Feb. 21, 1782, died in York, Dec. 24, 1800. His early education was conducted by his father, a dissenting clergyman of Leeds. In 1749 he entered the theological seminary at Northampton, under charge of Philip Doddridge, where he remained two years. Some doubts which he had entertained as to the validity of the evidences of revealed religion were here dispelled, but his theological views took the form of Unitarianism, as taught by Dr. Priestley. In 1752 he went to the university of Glasgow, where he remained three years,

and became intimate with Adam Smith, Black, Moore, and other eminent men. In 1756 he became pastor of the dissenting congregation at St. Saviour's Gate, York, a position which he retained for more than 40 years. He is recognized as one of the ablest, most eloquent, and most learned of the English Unitarians. Besides several polemical essays, he wrote "Discourses on the Providence and Government of God," and "Critical Remarks on several important Passages of Scripture," published after his death; and he compiled a "Selection of Psalms for Social Worship."

CAPPEL, the name of a French family which produced many jurists and theologians during the 15th, 16th, and 17th centuries. **I. Guillaume**, advocate general of the parliament of Paris, and in 1491 rector of the university. He opposed the claim of Pope Innocent VIII. to impose tithes upon the university. He afterward became a priest, and at his death was dean of the faculty of theology. **II. Jacques**, nephew of the preceding, also advocate general of the parliament, about 1520. He was author of several works, among which is *Mémoire pour le roi et l'Église gallicane*, in opposition to papal claims. **III. Louis**, the elder, born in Paris, Jan. 15, 1584, died at Sedan, Jan. 6, 1586. At 16 he was regent of humanities in the college of Cardinal Lemoine, and afterward professor of Greek at Bordeaux. He embraced the reformation, and after the massacre of St. Bartholomew was sent to Germany to solicit the aid of the German princes. William of Orange appointed him professor of theology in the newly founded university of Leyden. He returned to France, became chaplain in the Huguenot army, and finally took up his residence at Sedan as pastor and professor of theology. **IV. Jacques**, seigneur du Tilloy, grandson of Louis, born at Rennes in March, 1570, died there, Sept. 7, 1624. He was professor of Hebrew and theology in his native city, and author of several works, among which are valuable notes on the Old Testament, which are printed among the commentaries of his brother. **V. Louis**, the younger, brother of the preceding, born at Sedan, Oct. 15, 1585, died at Saumur, June 18, 1658. He gained a high reputation as professor of divinity and oriental languages at the university of Saumur, and as an exegetical and critical writer. His principal work is the *Critica Sacra*, upon which he was engaged for 36 years; it contains a list of many errors and various readings that have crept into the Scriptural text. He also engaged in a controversy with the Buxtorfs in regard to the Hebrew vowel points. They maintained that these are coeval with the alphabet; he, that they are not older than the 7th century.

CAPPONI, Gino, marquis, an Italian author, born in Florence, Sept. 14, 1792. His ancestors were called the Scipios of the Florentine republic. After spending several years in travel he became chamberlain of the grand duke of Tuscany, but not approving of his policy

he retired. In 1847 he was for a short time prime minister, and in 1849 a member of the provisional government of Tuscany. In 1859 he was chosen president of the *consulta*, and afterward became a member of the senate, and chairman of the committee relating to historical researches in Tuscany, Umbria, and the Marches. He was one of the founders of the *Antologia*, and after its suppression in 1842 he established in Florence the *Archivio storico italiano*, and in Paris (1845-'6) the *Gazetta Italiana*, in which he urges the secularization of the papal government. He has been for many years a member of the academy della Crusca, taking an active part, even after he became blind, in the preparation of new editions of the academical dictionary, and, together with Becchi, Borghi, and Niccolini, in that of an improved edition of Dante's *Divina Commedia* (Florence, 1887). He edited Colletta's *Storia del reame di Napoli* and the *Documenti di storia Italiana* (Florence, 1836-'7).

CAPRAJA (anc. *Capraria* and *Agilon*), a small volcanic island of the Mediterranean, between the N. point of Corsica and the coast of Tuscany. It is about 15 m. in circumference; its surface is generally mountainous, and its principal product is wine. Wild goats still abound in the mountains. It has a town of its own name, with a safe harbor. In 1507 the island was taken from Corsica by the Genoese, and it is now a part of the province of Genoa.

CAPRARA, *Giovanni Battista*, an Italian prelate and statesman, born in Bologna, May 29, 1733, died in Paris, June 21, 1810. He was not 25 years old when appointed by Pope Benedict XIV. vice legate at Ravenna. He was afterward papal nuncio successively at Cologne, Lucerne, and Vienna, and in 1792 was made cardinal. In 1800 he was created bishop of Jesi. Having been appointed in 1801 legate *à latere* to the French republic, he succeeded in arranging the terms of the concordat, which were agreed upon July 15, 1801; and in April, 1802, that document was promulgated at Paris, and the Roman Catholic form of worship was inaugurated at the church of Notre Dame with great splendor. In May, 1805, he crowned Napoleon at Milan as king of Italy. Returning to Paris as legate of the pope, he died there.

CAPREA, a small island in the Mediterranean, lying off the N. E. coast of Sardinia, and belonging to the province of Sassari. It contains about 6,700 acres, and is notable for having been for some years the residence of Garibaldi.

CAPRI (anc. *Capræa*), a small and rocky Italian island, in the Mediterranean, S. of the entrance to the bay of Naples; pop. about 5,000. It is celebrated for its fine climate, which makes it a favorite resort for invalids, especially for those suffering from chronic bronchitis. It is noted in history as the place where Augustus resided during his illness, and where Tiberius spent the last ten years of his life. The island is about 9 m. in circumference,

and surrounded by steep cliffs. In these cliffs are several remarkable grottoes, the most interesting of which is the Blue grotto, 165 ft. long, 100 ft. broad, and about 40 ft. high. It can only be entered in calm weather, by a boat through a natural arch 8 ft. high. The water within is 50 ft. deep, and like the walls and the roof is of a beautiful blue color. The principal town of the island, of the same name, is the see of a bishop, and contains a cathedral and some other churches; pop. about 3,400. There is also a small town called Anacapri. Between the two mountains of limestone (the highest of which is Monte Solaro, rising nearly 1,800 ft. above the sea) lies a fertile valley.



Cliffs of Capri.

which yields grain, olives, grapes, and other fruits. The inhabitants are engaged in the production of the red and white Capri wines and of oil, in fishing, and in catching quails, vast numbers of which are taken every spring and autumn on their passage from and to Africa. Remains of several of the 12 villas erected by Tiberius in various parts of the island are still to be seen, and other relics of antiquity have been excavated here. In 1806 it was in possession of the French; they were driven out by an English fleet commanded by Sir Sidney Smith, who placed there a garrison under Col. Hudson Lowe. In 1808 the French under Gen. Lamarque made a descent upon the island and forced the garrison to surrender.

CAPRICORN (Lat. *capricornus*, from *capr.* a goat, and *cornu*, a horn), a zodiacal constellation represented by a goat, or a figure half goat and half fish. Capricorn is believed to represent the form which poets say Pan assumed when, to escape Typhon, he sprang into the Nile. It is the tenth sign of the zodiac, and stands after Sagittarius and before

Aquarius. The sun enters it on Dec. 21, when our winter solstice takes place. But the precession of the equinoxes has moved the constellations about 80° , and the constellation Capricorn is not now in the sign of the same name, but in that of Aquarius.—The tropic of Capricorn is the southern of the two small circles which pass through the solstitial points at a distance of $23^\circ 28' 30''$ from the equator, and so called because it is apparently described when the sun seems to enter the sign Capricorn.

CAPSICUM, a genus of plants, from four species of which are obtained as many varieties of the so-called cayenne pepper. The name capsicum is also applied to the product itself. The genus is of the *solanaceae* or nightshade family, and has no relation with the family of *piperaceae*, which furnishes the real peppers. The four species referred to are *C. annuum*, *C. frutescens*, *C. cerasiforme*, and *C. grossum*. The first two only are of importance. The first is an annual herbaceous plant, remarkable for its hardy nature. A native of tropical countries, in which it thrives luxuriantly in dry and poor soils, it is also cultivated in almost all parts of the world. It grows 2 or 3 feet high, and bears a pod or seed vessel, called also its berry, of ovate or conical form, recurved at the end, green when immature, but bright scarlet or orange when it ripens in October. It is used in the green state for pickling, and in medicine



Capsicum annuum.

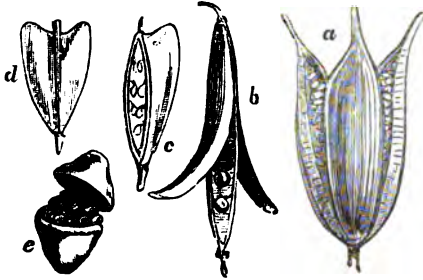


Capsicum frutescens.

when ripe and dried, and is ground to powder to make cayenne pepper. In England the dried berries kept in the shops are called chillies. This variety is imported from the West Indies, and is raised in our own gardens. Its product is hot and pungent, but without aroma. *C. frutescens* furnishes the so-called bird or Guinea pepper, a hotter and more pungent and better flavored article, and to some extent aromatic. The plant is a shrub, best known in the East Indies. The berries are scarcely an inch long, and only a line or two broad. They contain each about a dozen reniform seeds.—The active principle of capsicum, called capscine, is a volatile liquid, thick when cold, but very fluid before it disappears by heat in fumes. The vapor is so pungent that what is produced from half a grain, when dispersed in a large room, will cause all present to cough and sneeze. It is obtained by digesting the alcoholic extract in ether and evaporating.—Capsicum is largely employed as a condiment, acting as a stimulant and aiding digestion. For these properties it is administered as a medicine; and it is also highly useful as a gargle in malignant scarlatina. In the West Indies, for violent cases of this disease, the preparation for both uses is to infuse for an hour in a pint of boiling vinegar and water two tablespoonfuls of the powdered pepper with a teaspoonful of common salt. When cold, the liquid is strained, and given in the dose of a tablespoonful every half hour. Capsicum is said to relieve the nausea of seasickness. Its local stimulant action renders it useful in cases of atonic dyspepsia, but is contraindicated whenever there is irritation or inflammation of the stomach. It is occasionally added to bitter infusions and tinctures for the purpose of rendering them more stimulating. The dose of powdered capsicum is from 1 to 5 grs.; that of the tincture from 5 to 15 drops. It is also employed externally as a rubefacient and stimulant, either in the form of a cataplasm, lotion, or tincture.—The commercial cayenne is subject to gross adulterations. Red lead and vermilion, or sulphuret of mercury, are the worst materials introduced, and cases of poisoning are reported from this cause, both the lead and mercury having the property of aggregating in the system when taken in small quantities. They are added to keep up the color, which gradually fades with the age of the capsicum, also to increase the weight, and to disguise the other ingredients. Ochres are also employed for similar purposes; salt also, to improve the color and add to the weight. Ground rice and turmeric are more harmless additions.

CAPSULE (Lat. *capsula*, a small box), a name given by botanists to any kind of dry seed vessel containing many cells and seeds, such as poppy heads, &c. The pods of peas and beans, &c., are called capsules, as well as the seed-containing vessels or fruit of many other families of plants. A capsule usually opens by valves; and hence different varieties have been

named bivalve, trivalve, quadrivalve, and multivalve. The parts of a capsule are: 1, the valves, ribs, or divisions which form the outward shell, and shield the fruit externally; 2,



Principal kinds of Capsules.—a. Three-valved Capsule, St. John's Wort. b. Siliqua, Capsule of Cress. c, d. Silicle, Capsule of Shepherd's Purse (c showing distribution of seeds). e. Pyxis, Capsule of Purslane.

the partition walls, which form different cells internally; 3, the axis or columella, which unites the seeds with the internal parts of the capsule; 4, the cells occupied by the seeds; 5, the proper receptacle of each seed; and 6, the seeds contained within the capsule. According to the number of internal partitions in a capsule, they have been named unilocular, bilocular, trilocular, multilocular. Capsular seed vessels are generally dry and hard when ripe; and in this respect they are unlike the pulpy fruit of apples, plums, &c., or the juicy oranges and lemons. All fruits, however, are merely seed vessels, and the name capsule is usually applied to all dry, hard seed vessels, irrespective of particular forms and families of plants.

CAPTAIN, the rank designating a commander of a company in infantry, or of a squadron or troop in cavalry, or the chief officer of a ship of war. In most continental armies of Europe captains are considered subalterns; in the British army they form an intermediate rank between the field officer and the subaltern, the latter term comprising those commissioned officers only whose rank does not imply a direct and constant command. In the United States army the captain is responsible for the arms, ammunition, clothing, &c., of the company under his command. The duties of a captain in the navy are very comprehensive, and his post is one of great responsibility. In the British service he ranks with a lieutenant colonel in the army until the expiration of three years from the date of his commission, when he takes rank with a full colonel. In the naval service of the United States a captain ranks with a colonel. In the old French service he was forbidden to lose his ship under pain of death, and was to blow it up rather than let it fall into the hands of an enemy. The title of captain is also applied to masters of merchant or passenger vessels, and to various petty officers on ships of the line, as captain of the fore-castle, of the hold, of the main and fore-tops, &c. The word is of Italian origin, mean-

ing a man who is at the head of something, and in this sense it is often used as synonymous with general-in-chief, especially as regards his qualities for command.

CAPUA, a city of Italy, in the province of Caserta, on the river Volturno, 14 m. from its mouth in the Mediterranean, and 15 m. N. of Naples; pop. about 12,000. The city is strongly fortified, the works having been remodelled and strengthened in 1855. The cathedral and the church of the Annunziata are splendid edifices, and contain many antique bass reliefs, and there are ancient inscriptions under the arch of the piazza de' Giudici. In 1803 the city suffered considerably from an earthquake. In 1860 it was besieged by a portion of the army of Victor Emanuel, and surrendered Nov. 8.—Ancient Capua lay at a distance of 2 m. from the modern city. Its origin and early history are obscure. It was founded or colonized by Etruscans, according to some authorities as early as 800 B. C., and was originally called Vulturum. It fell under the temporary sway of the Samnites in 423, from whom it received its present name. In 343, when threatened by the same people, the citizens called in the aid of the Romans, and were shortly afterward compelled to acknowledge the supremacy of Rome. It successfully resisted Pyrrhus, king of Epirus, but after the battle of Cannæ (216) the popular party deserted Rome and opened the gates to the Carthaginian general. The winter spent by the Carthaginian troops in Capua demoralized them greatly, and was considered by the Romans the main cause of Hannibal's ultimate defeat. For the extravagance and effeminacy of its inhabitants, Capua bore a reputation similar to that of Sybaris and Sardis. It was famous for its manufacture of perfumes, with which the *unguentarii* or perfumers of Capua in later times supplied the whole empire of the West. It was early celebrated for its gladiatorial exhibitions, and from Lentulus's school of gladiators in this city Spartacus, the leader in the servile insurrection, first broke loose with 70 companions. The desertion to Hannibal was punished with utmost severity by the Romans, when they again entered Capua (211). The local magistracies were abolished, and a Roman prefect was appointed to rule over the city. Julius Cæsar procured the passage of a law during his consulship, in 59, in accordance with which 20,000 Roman citizens were settled in the environs of Capua. This circumstance conferred a new era of prosperity upon the city. The barbarian invasions were fatal to old Capua. Genseric and his Vandals devastated it in A. D. 456. Narces restored it, but it sank again after the conquests of the Lombards in southern Italy. It was finally destroyed by the Saracens about 840, who reduced it to ashes. A few years afterward Bishop Landolphus induced the inhabitants to return and establish a new city on the site of ancient Casilinum. This was the origin of modern Capua. The ruins

of the amphitheatre, built of tiles and faced with white marble, are an object of attraction to antiquaries. The remains of old Capua have



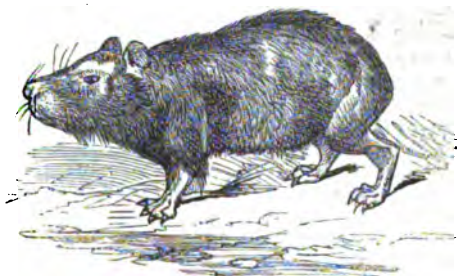
Remains of Amphitheatre at Capua.

been described by Rinaldo in his *Memorie istoriche della città di Capua* (Naples, 1753), and in Rucca's *Vetere Capua* (Naples, 1828). The site of old Capua is now occupied by the large village of Santa Maria di Capua, or Santa Maria Maggiore.

CAPUCHINS, a religious congregation belonging to the Franciscan order, instituted by Matteo Baschi about 1525. Believing that he was divinely commissioned to revive the old spirit of his order, and learning that the modern habit of the brethren was different from that of St. Francis, he appeared in a garb consisting of a coarse garment without any scapulary, and a *capuche*, or hood shaped like a sugar loaf; hence the name of the order. This being condemned by his superiors as a novelty, he had recourse to Pope Clement VII., who gave him permission to wear the hood, and also permitted those who wished to imitate him to form a congregation. In 1526 Clement VII. gave them further permission to wear the habit and also a beard; and in 1528, by a new bull, he confirmed the new order, which took the name of Capuchins. They were to reside in solitary places, and live as hermits. The rules of the order are very strict; they are obliged to recite the canonical hours without singing, and the matins are to be said at midnight; an hour is to be spent every morning and evening in mental prayer and in silence; their food is of the simplest kind, one kind of meat only being allowed, and on fast days they are only allowed a kind of cheese called *cotta*. In 1624 Urban VIII. caused a new church to be built for them at Rome, near the Barberini palace, and in 1681 the Capuchins took possession of it. The church contains the famous painting of St. Michael the archangel, by Guido. This order

has been established in various countries of Europe, and also in Egypt, Turkey, Persia, and India. It was introduced into France in 1574, and extended rapidly, many persons of rank entering it. Cardinal Richelieu was a great protector of the order. It sent out missionaries to Brazil, the West Indies, Acadia (now Maine) and the adjacent British provinces, and also to Louisiana. Their institutions in Europe were broken up by the French revolution and its consequent movements, but have been renewed from time to time. In the United States they have houses at Milwaukee, Utica, Syracuse, New York, and Trenton; and the archbishop of Halifax is a member of the order. Among its eminent men are St. Felix of Cantalice, F. Joseph du Tremblai (baron de Maffai), founder of the nuns of the congregation of Calvary, F. Ange de Joyeuse (duke de Joyeuse), and F. Bernardin de Pequigny, author of a highly esteemed commentary on the Epistles of St. Paul. The members of the order generally write after the name O. Min. Cap. (*Ordinis Minorum Capuccinorum*). Nuns of this rule were first established at Naples in 1538 by Mother Maria Lorenza Longa.

CAPYBARA (*hydrochærus capybara*), the largest of living rodent animals, confined exclusively to South America. It is more than 8 ft. long, with feet so short that its bulky hog-like body, clothed with long coarse hair, almost touches the ground. The dental formula is: incisors, $\frac{2}{2}$, and very large; molars, $\frac{4-4}{4-4} = 20$, rootless. The head is large, the lips thick and not cleft, the muzzle prominent and blunt; eyes small and high on the head, and ears small; fore feet with 4 toes, hind feet with 3, partly connected by membrane, and ending in pig-like hoofs; tail wanting. The color is a dingy gray, with a yellowish tinge. According to Owen, the molars of rodents, as well shown in this animal, come near those of the elephant, the number of transverse plates increasing with the jaw with age, the whole number not coming into use at once. The whole appearance of the capybara is so swinish that it has been called the water hog, as its generic name indicates; it is one of the connecting links between



Capybara.

the rodents and the pachyderms. It is an excellent swimmer and diver, and able to remain beneath the surface at least 10 minutes; the

height of the eyes enables it to swim with very little of the head exposed. Its food is vegetable, and is crushed very fine in order to enable it to pass through the very narrow throat. It is found in small herds near the banks of the rivers in tropical South America. It is hunted for its flesh, which is excellent both fresh and salted; the jaguar feeds upon it very largely. When disturbed it makes a loud and prolonged noise.

CARABOBO. I. A N. W. maritime state of Venezuela, bordering upon Carácas, Barinas, Barquisimeto, and Coro; area about 7,000 sq. m.; pop. 235,000. It is divided into two distinct parts, the highlands and the llanos or plains, and is traversed by the Venezuela coast chain of mountains, from which 21 rivers descend to the sea, though only one of them is navigable, the Yaracuy. The state is watered by 74 rivers, the largest of which, the Cojedes, formed by the confluence of the Barquisimeto and Buria, is navigable from 12 m. below the town of the same name to its mouth in the Portuguesa, a distance of 90 m. The lake of Valencia, formerly called by the Indians Tacarigua, belongs in part to this state. There are also several smaller lakes in the plains of Pao, San Carlos, and Baul, many of which dry up during the summer. The state is divided into 7 cantons and 88 parishes. Of the inhabitants about one half devote themselves to agriculture, and one fourth to cattle raising. Wheat is raised in abundance, as well as most of the tropical fruits. The capital of the state is Valencia, and the chief port Puerto Cabello, which, after that of La Guayra, is the most frequented by foreign shipping of any in the republic. The climate is cool during the summer in the highlands and generally healthy; in the plains the temperature is much higher, but there is comparatively little sickness, except in the valleys contiguous to the Santa Maria mountains and some parts of the coast, where fevers are common. In winter, from May to November, the greater part of the plains is inundated. The exports mainly consist of coffee, cacao, indigo, hides, sugar, cotton, and tobacco, to foreign countries; and salt, preserves, cassava, plantains, rum, maize, rice, &c., to the neighboring states. Some horned cattle and swine are reared; and there are numerous herds of asses. II. A town from which the state takes its name, situated 80 m. S. W. of Valencia, famous for a battle fought there on June 24, 1821, which was decisive of the independence of Venezuela and the associated republics.

CARACALLA, Marcus Aurelius Antoninus, a Roman emperor, born at Lyons A. D. 188, died in 217. He was originally called Bassianus, but received the nickname of Caracalla from a favorite Gallic tunic which he introduced into Rome. He accompanied his father Septimius Severus on his expeditions against the Parthians and to Britain, and on his death at York in 211 he ascended the throne with his brother

Geta, but soon caused the murder of the latter, and, according to Dion Cassius, of 20,000 Romans who were his partisans, among whom was the jurist Papinian. He multiplied extortions in order to purchase the favor of the soldiery, gave the right of Roman citizenship to all free men of the empire in order to impose taxes upon their estates, and admitted Egyptians to the senate. He made unimportant expeditions against the Gauls, Goths, and Parthians, and at Alexandria took revenge for some epigrams by a general massacre of the inhabitants. He was assassinated near Edessa on his way to Carrhae, at the instigation of Macrinus, the pretorian prefect, who was proclaimed his successor by the army.

CARÁCAS. I. A N. state of Venezuela, bordering on the Caribbean sea, Barcelona, Guayana, Apure, Barinas, and Carabobo; area, 25,461 sq. m., 4,527 of which are uncultivated; pop. about 800,000. The state may be said to be divided into two distinct zones. The first or northern, with a rocky coast dotted with excellent ports, rich and fertile valleys, cultivated uplands, barren and craggy hills, and lofty mountains, comprises the agricultural and commercial region of the republic. The second presents vast plains or steppes, extensive table lands, savannas, some low and others of considerable elevation, small woods, great palm groves, and immense forests. The mountain system called the Venezuela coast chain, considered as a continuation of the Cordillera of the Andes, traverses the state like a wall uninterruptedly from Puerto Cabello W.; and the interior chain in almost the same direction, but in two separate branches. The mean elevation of the coast chain is about 5,000 ft.; a few summits, such as the Silla de Carácas, attain a height of over 8,000 ft. above the level of the sea. These ranges enclose many longitudinal valleys, remarkable among which is the delightful valley of Aragua, where sugar, indigo, cotton, and European wheat are largely produced. The llanos of Carácas are grassy plains, and the abode of numerous herds of cattle and wild horses. Humboldt gives 3,070 ft. as the height of the plateau of Carácas. The state is watered by no fewer than 145 rivers, and an immense number of smaller streams. The largest rivers are the Guárico, Orituco (an affluent of the former), and Manapire, 372, 213, and 189 m. in length respectively, and navigable for 150, 150, and 12 m. The lake of Valencia, which belongs in part to this state, is 27 m. long from E. to W., and 12 m. wide; and there are besides the lagoons of Unare (separated from the sea by a sandy tongue of land, and the shores of which abound in excellent salt), Encantada, Taiguai, Palmananita, and many smaller ones. Few of these lagoons become altogether dry in the summer. The climate, though extremely varied, is in general salubrious; notwithstanding the excessive heat in the plains, fevers are not common, except on some parts of the coast subject to inundation.

and in the dense forests, where ague is prevalent. About half the inhabitants are engaged in agriculture, and the rest in cattle raising, commerce, and arts. Coffee, cacao, indigo, cotton, tobacco, sugar, maize, rice, wheat, plantains, and the greater number of the tropical fruits and vegetables, with a few of the European, are produced. The state is divided into 16 cantons and 97 parishes. The chief port is La Guayra. **II.** An inland city, capital of the state and of the United States of Venezuela, in lat. $10^{\circ} 30' 50''$ N., lon. $67^{\circ} 4' 45''$ W., 7 m. from its port, La Guayra, on the Caribbean sea, with which it is connected by railway; pop. about 60,000. The city stands at an elevation of 3,100 ft. above the sea. On one side a slope gradually descends toward the river Guaire, fordable in all seasons except immediately after heavy rains, when it swells suddenly and rushes rapidly along, but very soon subsides; toward the south is another descent to the river Aracoe, here crossed by a handsome bridge. The Caracota, a sort of rivulet, separates the suburb San Juan from the city proper; and the water of the Catuche, which flows through the town, supplies the public fountains and private residences. The streets are straight and cross each other at right angles. The houses, some of which have several stories, are well and strongly built, and generally handsome. Among the wealthy there is a great tendency to luxurious display in their dwellings. There are 10 churches, including the cathedral, an unsymmetrical edifice, which was injured by an earthquake in 1826. Six monasteries and nunneries have been converted into school houses, and the cloistral endowment suspended. Carácas has a university, founded in 1778; a seminary; three academies, military, painting, and music; several public and a number of private schools, a theatre, and patriotic, agricultural, and emigration societies. There are eight fine bridges. Of the eight public squares, the largest has an area of $8\frac{1}{2}$ acres, is well paved, and is surrounded by the principal public buildings and the general market. There are in the city several printing offices and newspapers, and a number of private societies and corporations. The climate, compared by Humboldt to a perpetual spring, is delightful and very salubrious. Carácas communicates by a railway with its port La Guayra, and is the centre of an important commerce with the interior and with foreign nations. (See VENEZUELA.)—Carácas was founded by Diego Losada in 1567, in the Valle de San Francisco, and was named Santiago de Leon de Carácas; but the last word, the name of the indigenous inhabitants of that region, who energetically strove to maintain their independence, has alone been preserved. In 1766 the city and the beautiful valley which surrounds it were visited by smallpox, which carried off 8,000 of the inhabitants. In 1812, when the population was 50,000, an earthquake destroyed the city, burying 12,000 persons beneath

the ruins. Political perturbation following that catastrophe reduced the population to about 35,000; but it afterward began to grow anew, and has since steadily advanced.

CARACCIOLI. **I. Domenico**, marquis, an Italian statesman, born in Naples in 1715, died in 1789. In 1763 he was ambassador to London, and in 1770 he was sent in the same capacity to France, where he became acquainted with D'Alembert, Diderot, Condorcet, and other encyclopædists. In 1781 he was appointed viceroy in Sicily, where he distinguished himself principally by the abolition of torture; and six years afterward he was made minister of foreign affairs. **II. Francesco**, prince, a Neapolitan admiral, born at Naples in 1748, died in 1799. He repeatedly commanded the Neapolitan fleet, when acting in concert with the English against the French. In 1798 he commanded one of the vessels which conveyed the royal family to Sicily under the command of Nelson. Having returned to Naples, he joined the republicans, was appointed commander-in-chief of the navy of the "Parthenopean Republic," and successfully opposed with a few ships the landing planned by the combined English and Sicilian fleets. Naples having been retaken in 1799, he was arrested, and, in violation of the capitulation by which the officers of the late republican government were allowed to leave the country unmolested, he was brought a prisoner on board Nelson's ship, arraigned before a Sicilian court martial, and condemned to be hanged. A request was presented in his name to the English admiral for a less ignominious mode of death; but Nelson, through the influence of Lady Hamilton, declined acceding to it, and Caraccioli was suspended from the yard arm of a Neapolitan frigate.

CARACTACUS, king of the Silures, an ancient British people who inhabited Wales, died about A. D. 54. He resisted the Romans for nine years. Ostorius, sent by the emperor Claudius, at length defeated him and took his wife and children prisoners. He himself took refuge with Cartimandua, queen of the Brigantes (York), who delivered him for a reward to the emperor. He was taken to Rome (51) and exhibited to the people; he afterward addressed the emperor in a speech which has been preserved by Tacitus. His proud bearing and noble and pathetic speech so won the admiration of Agrippina and Claudius, that they pardoned him and discharged him with presents.

CARAFA DE COLOBRANO, **Michele**, an Italian composer, born in Naples, Nov. 28, 1785, died in Paris, July 26, 1872. He studied music under eminent masters, but enlisted in the Italian army, was captured by the French in 1806, became equerry of Murat, and subsequently served under him in Sicily and in Russia, leaving the army in 1814 with the rank of chief of squadron. Returning to Italy, several of his operas were successfully produced at Naples, Venice, Milan, and Vienna; and in 1821 he became a permanent resident of Paris. Promi-

nent among the numerous operas which he brought out there were *Le solitaire* and *Masaniello*; but even these, though remarkable for sweetness and vivacity, are now obsolete, and the attempt to revive *Le solitaire* in 1856 was unsuccessful. He has been charged with imitating Rossini, but his merits as a composer of pleasing though not vigorous music were incontestable, and he was elected to the academy of fine arts, and was professor at the conservatoire and director of the military music at the Gymnase, and in 1847 was made an officer of the legion of honor. The latter part of his life was spent in poverty.

CARAITES. See KARAITES.

CARAMAN, or *Karaman* (anc. *Laranda*), a town of Asiatic Turkey, in the vilayet and 58 m. S. E. of Konieh, at the foot of Mt. Taurus; pop. about 12,000. It contains the ruins of several beautiful Saracenic mosques, one of which is of marble, covered with arabesques, and supported in the interior by rows of columns. There are also several temples of modern date, a handsome Armenian church, and a Turkish castle encompassed by a wall which also encloses about 100 houses. Coarse blue cotton cloths and similar fabrics are manufactured.—Little is known of the ancient Laranda, on or near the ruins of which the present town was founded in the 14th century by Karaman Oglu, a Turkish chief, after whom it was named. It was the capital of a Turkish kingdom until the subjection of Caramania by Bajazet II. in 1486, when the seat of government was removed to Konieh (Iconium). The name of Laranda or Laranda is still used by the Christian inhabitants of the country.

CARAMANIA, *Karamania*, or *Karaman*, the former designation of a province of Asiatic Turkey, in the south of Asia Minor, now included in the vilayet of Konieh, mainly between lat. 37° and 39° N., and lon. 31° and 36° E. It embraces ancient Lycaonia and Isauria, and portions of Pisidia, Pamphylia, Cilicia, and Cappadocia. It is noted for its genial climate, and for its tobacco, silk, cotton, sesamum, honey, wax, and excellent fruit. The soil is rich and dry, yielding abundant harvests; the vine and fig tree, the laurel, myrtle, and clematis, and many odoriferous shrubs flourish in profusion. The Taurus range traverses its entire length, and forests of oaks and pines 100 ft. high cover the mountain. The principal rivers are the Kizil-Irmak and the Sihun. In the S. W. are numerous small lakes, also mineral springs. Fish abound in the rivers and the numerous small streams of the country. The inhabitants are mainly devoted to agricultural pursuits, particularly to the rearing of live stock, the vast plains affording abundant pasturage. The villages of the shepherds are composed of huts covered with skins; most other houses are of earth, or of brick baked in the sun, and present a miserable appearance. Trade embraces, besides the products named, wool, horse and camel hair, gum tragacanth, which

abounds in the mountainous districts, and various other commodities. The exports are carried on by caravans or through the nearest shipping ports.

CARAT, the name of an imaginary weight by which diamonds are rated; and also a term used for expressing the fineness or purity of gold. The alloy is supposed to be divided into 24 parts called carats, and its fineness is reckoned according to the number of these which are pure gold. Gold 20 carats fine is 20 parts of pure gold alloyed with 4 of some other metal. The term has been so long in use that its origin is very obscure. Some suppose it to be derived from the Greek *κεράριον*, a fruit corresponding to the Latin *siliqua*; whence the Arab word *kyrat*, a weight, imaginary part, or share. Bruce says of a bean he met with in a famous gold mart of Africa: "The fruit of the tree called *kuara* is a red bean which seems to have been in the earliest ages used for a weight of gold. This bean is called carat." As usually employed by jewellers, the weight of a carat is 4 imaginary grains, of which $74\frac{1}{4}$ are required to counterbalance 72 grains troy.

CARAVAGGIO, a town of N. Italy, in the province and 14 m. S. of Bergamo; pop. about 7,000. The old walls have been recently demolished, but a ditch filled with water still remains, and is crossed by six bridges. The parish church has a high bell tower, and paintings by Campi; and the sanctuary of the Madonna, beautifully situated a little way out of the town, is a popular resort of pilgrims. In 1448 a Venetian army was totally defeated here by the Milanese under Francesco Sforza.

CARAVAGGIO. *L. Michel Angelo Amerighi da*, an Italian painter, born at Caravaggio in 1569, died near Porto Ercole in 1609. His father was a mason. He himself in his boyhood was a paint grinder for artists in Milan. These artists awakened his genius and love for art, and he made his way to Venice, where he studied the works of Giorgione, whom he imitated in his earlier style. Leaving Venice, he went to Rome and engaged himself to a trading artist, for whom he painted chiefly flower and fruit pieces. Soon wearying of this, he adopted a peculiar style of his own, of which he was the chief master. His life was wild and vagrant. Having killed a companion in a brawl at Rome, he fled to Naples, and thence to Malta, where he was knighted. Another quarrel with a person of rank caused him to be thrown into prison. Contriving to escape, he fled to Sicily, but was pursued, assaulted by armed men, and seriously wounded. His friends having procured the pope's pardon for his first crime, he returned to Italy, but on landing at Porto Ercole in Tuscany was arrested by mistake, lost his money and clothes, suffered from inflammation in his unhealed wounds, from heat, anxiety, and exhaustion, and sat down and died near that place, on his way to Rome. He was 40 years old. His pictures treat of vulgar and

often repulsive themes. His imagination was coarse, his temper gloomy and passionate. But his paintings, however gross in conception, display grandeur, power, and pathos. Annibale Carracci said of Caravaggio that "he ground flesh," not pigments. Some of his sacred pieces were so offensive that they were removed from the altars they occupied. Caravaggio's most celebrated work is an "Entombment of Christ" in the Vatican. A "St. Sebastian" in the capitol at Rome, and a "Supper at Emmaus" in the palazzo Borghese, are among his masterpieces. A "Holy Family," in the same palace, has been much admired.

II. Pelidoro Caldara da, an Italian painter, born at Caravaggio in 1495, murdered at Messina in 1543. Of humble parentage, he found employment in Rome as a workman for the artists who were engaged in copying the paintings of Raphael; and attracting the attention of that master by his talent, he became his most distinguished disciple, as attested by his friezes and other ornaments for Raphael's paintings in the Vatican, which acquired celebrity as exquisite imitations of Athenian purity and perfection. He was the first of the Roman masters to employ chiaroscuro in the management of masses of light and shadow, and he and his friend Maturino were extensively engaged in embellishing the exteriors of the principal palaces and houses with paintings of illustrious masters, in the *sfraffito* style. In 1527, when Rome was sacked by the imperialists, he fled to Naples, where Andrea da Salerno procured employment for him; and subsequently he designed at Messina the triumphal arches erected on occasion of the return of Charles V. from Tunis, and executed in the same city his masterpiece, representing Christ bearing the cross. He was about to return to Rome when he was murdered and robbed by his Sicilian servant. His principal paintings are in Rome, Naples, and Messina.

CARAVAN and **CARAVANSARY**, an organized company of travellers or pilgrims in Asia and Africa, and an edifice for their lodging. The word is derived from the Persian *caravan*, a trader. Caravans are formed for the purpose of mutual protection. Every caravan is under the command of a chief (*caravan-bashi*), and is subjected to regular discipline. Many of them are under control of the government, by whom the chief is appointed, and are attended by a sufficient number of troops for defence. Camels are used as a means of conveyance on account of their remarkable powers of endurance, and there are generally more camels than persons in a caravan. The commercial intercourse of Asia and Africa from the earliest period has been carried on chiefly in this way; and in this country the trade between Kansas and New Mexico is conducted by caravans of wagons. The most noted caravans are those of pilgrims who annually proceed to Mecca from every country where the Mohammedan faith is established.

The principal caravans are those of Damascus, composed of pilgrims from Europe and western Asia, and Cairo, consisting of Mohammedans from all parts of Africa. The Syrian caravan is accompanied by one of the military pashas of Damascus or one of his principal officers, and usually travels by night only, when torches are used. An important commerce in all kinds of Indian, Arabian, and Persian commodities is carried on by means of caravans which proceed from Bagdad and Bassorah to Aleppo, Damascus, and Diarbekir; while European goods, chiefly English cottons, are distributed throughout the interior of Asiatic Turkey by the same means. Formerly a caravan consisted of from 500 to 4,000 persons, and an equal or greater number of camels; but many of them, especially those to Mecca, are now much smaller and of less importance, owing to the improved means of modern travel.—The caravansaries for pilgrims, now better known by the Turks and Arabs as khans, for the most part built as charities, are generally the rudest structures consistent with the purpose of protection. They are chiefly erected in desert places, and are furnished with water brought from a great distance. The caravansaries in cities, intended more for traders, are better built, and sometimes contain very good apartments, though unfurnished.

CARAVELLAS, a seaport town of Brazil, in the province of Bahia, on a river and near the bay of the same name, 475 m. N. N. E. of Rio de Janeiro, in lat. 17° 32' S., lon. 39° 14' W.; pop. of the town and district about 6,000. The town, though of small size, is handsomely built on a sandy elevation, and presents a cheerful and agreeable aspect. Its importance is mainly due to its being the port of the surrounding country, and the headquarters of the Abrolhos whale fishery. The fishery lasts from the end of June till the end of September; the cachalot is the whale chiefly caught, and each one usually affords from 2,000 to 3,000 gallons of oil, worth on the spot from 80 cents to \$1 50 per gallon. There is also considerable coasting trade. In the neighborhood are extensive groves of cocoa palms.

CARAWAY, the fruit or seeds of the *carum carui*, a small biennial plant of the family *umbellifera*, which grows wild in the meadows and pastures of central and northern Europe, and is cultivated in gardens, as it is in this country. The root, which in the cultivated plant resembles the parsnip, is used for food in the north of Europe. The seeds mature the second year of the growth of the plant. They are used in confectionery, to flavor liquors and cakes, and also bread, cheese, and other articles of food. Their medicinal action is to stimulate the digestive organs, and remove flatulency; they are used also to aid or modify the action of other medicines. An essential oil, *oleum cari*, is prepared by distillation of the seeds, which possesses their properties, and is used to flavor medicines, and to correct their

nauseating and griping effects. Caraway seed is imported from Europe, and is also supplied



Caraway.

in part from our own gardens. It is largely cultivated in Essex and Suffolk, England.

CARBAZOTIC ACID. See PICRIC ACID.

CARBOLIC ACID (synonymes, carbon oil acid, phenol, phenyl hydrate, phenyl oxyhydrate, phenyl alcohol, phenous acid, phenic acid, phenylic acid, phenylous acid, phenylic alcohol, phenolic acid, phenylated water, spiro, salycon, coal-tar creosote, and incorrectly creosote and cresylic acid), a chemical substance now largely employed in medicine and the arts. In 1832 Reichenbach discovered among the products of the distillation of beech-wood tar a peculiar body to which, on account of its property of preserving meat from decay, he gave the name of creosote. In 1834 Runge found a similar substance in coal tar, which he named carbolic acid, or carbon oil acid. Immediately there arose a controversy among chemists as to the true constitution of these two bodies. Reichenbach, jealous of his fame, maintained that they were identical; but Laurent in 1841 found carbolic acid to be a different body from creosote, and it was he who introduced the new name of phenol, phenic acid, phenylic hydrate (Gr. *phalveiv*, to light), in allusion to the use of coal gas for illuminating purposes. The confusion engendered by these early controversies is still apparent in scientific works, and even Gmelin treats of carbolic acid and creosote as being identical. The difficulties of the case have not been improved by the multiplicity of names which have been given to the compounds. For the sake of accuracy and simplicity, it would have been better if all parties had adhered to Runge's original name of carbolic acid.—Runge wrote in 1834: "Carbolic acid is a colorless, acid, oily stuff, that sinks under water, and possesses great refracting power. Its odor is empyreumatic, taste highly caustic and burning. It has powerful action on the skin, accompanied by a burning sensa-

tion, producing a white stain, which afterward becomes red, and the skin peels off. In this respect it resembles creosote, but it differs from creosote in being decidedly acid, in being precipitated by acetate of lead, and in not being acted upon by ammonia and air, but changed by even dilute nitric acid into a red-brown substance; it also precipitates gelatine; all which properties are wanting in creosote. Carbolic acid precipitates albumen as well as gluten, and protects organic matter from decay; and what is more remarkable, it immediately removes all odor from decaying organic matter, such as meat, when this class of bodies is covered with the liquid acid, and in this property is preferable to chlorine. It is not identical with the principle of smoke, as meat treated with it tastes abominably." In his treatise on elementary chemistry, published in 1847, Runge recommends carbolic acid for the embalming of bodies; he says: "The carbolic acid of coal tar, discovered by me, is preferable for this purpose to sublimate or any other agent; it has extraordinary action on decaying matter: for example, stinking fish become entirely inodorous in carbolic acid, and after being dried are not again subject to putrefaction." Since the early researches of Runge many new facts have been ascertained in reference to the body discovered by him. Carbolic acid crystallizes at ordinary temperatures in long colorless needles, apparently belonging to the trimetric system and having a specific gravity of 1.06. The crystals melt at 105° F., while the liquid boils at 369°. They are deliquescent, smell like wood-tar creosote, require 25 to 30 parts of water for solution, but dissolve in all proportions in alcohol, ether, glycerine, and strong acetic acid. Much of commercial creosote consists solely of carbolic acid. Compounds of carbolic acid with potash, soda, lime, &c., can be obtained; they are called carbolates, and are quite unstable. It is a volatile substance, and is hence readily diffused through the air. A plumped hide immersed in an aqueous solution of carbolic acid is not tanned, but it is not liable to further putrefaction. India rubber is not attacked by carbolic acid, but euphonium, copal, and other resins are easily dissolved by it, and remain sticky on drying, which prevents this property of the acid from being employed in the manufacture of varnish. It is a violent poison to plants and animals, and hence must be handled with care. The cases of death from its incautious use are numerous. Owing to its antiseptic power, carbolic acid is a valuable topical application in many surgical cases attended with offensive purulent or other discharges. It was extensively tried by Crookes as a prophylactic against the spread of the cattle plague. As it is a volatile substance, it possesses the great advantage of being readily diffused through the air.—Carbolic acid paper, which is much used for packing fresh meats, is prepared by melting five parts of stearine at a gentle heat, then ther-

oughly incorporating two parts of carbolic acid, and subsequently adding five parts of melted paraffine. When fused it can be applied with a brush. Pieces of card-board paper saturated with the acid are employed as antiseptics and insect exterminators. When dissolved in 230 parts of water it is used as a gargle, or in 25 parts for painting the throat, or in 50 parts for a carbolic spray. It may be readily mingled with olive or other oils (1 to 25), or with glycerine, for dressing cuts and sores. A great number of remedial agents and disinfecting compounds have been prepared with carbolic acid, a description of which may be found in "The Antiseptic System: a Treatise on Carbolic Acid and its Compounds," by A. E. Sansom, M. D., London; also in a pamphlet by Dr. E. R. Squibb of Brooklyn, "On the Phenols from Coal Tar." In cases of accidental poisoning, olive oil and castor oil are freely given. Saccharate of lime is also recommended as a remedy, and while this is preparing a little carbonate of lime can be administered.—Some of the distinguishing differences between carbolic acid and creosote are: An alcoholic solution of carbolic acid is turned brown by an alcoholic solution of ferric chloride; creosote similarly treated yields an emerald green color. Carbolic vapor passed over heated zinc dust is easily reduced to benzole. Carbolic acid boils at 369° F.; creosote readily dries up at 212°. Carbolic acid does not affect a ray of polarized light; creosote bends it to the right. Carbolic acid gives a jelly when shaken with collodion; creosote does not. The substitution products and the colors derived from carbolic acid are also characteristic.—Numerous compounds, some of them of great value in the arts, have been prepared from carbolic acid, which will be described under their respective names; the most important of them is perhaps picric acid. Berthelot has succeeded in preparing carbolic acid from acetylene, by treating the latter with sulphuric acid, making a potash salt with the product, and subsequently fusing with caustic potash, when carbolic acid is copiously evolved. Very similar to carbolic acid are two compounds, often found associated with it, called cresol and xylol, which are employed in many instances as substitutes for carbolic acid. It is proposed to call this class of remedies azymotics, from their property of preventing and sometimes healing infections or zymotic diseases, *i. e.*, diseases produced by fermentation, according to the germ theory of this class of phenomena.—The following method of obtaining pure carbolic acid from coal tar is given by Hugo Müller (*Zeitschrift für Chemie*, 1865, p. 270): The aqueous solution obtained by treating coal tar with caustic soda or milk of lime, or a mixture of the two, which contains, besides carbolic acid, certain easily oxidizable substances, and a not inconsiderable quantity of naphthaline, is diluted with water as long as naphthaline is thereby separated, and the liquid, which soon turns dark brown, is exposed to

the air in shallow vessels for several days and frequently stirred. The brown solution is then filtered, the quantity of carbolic acid contained in a given quantity of it is determined, and the proportion of acid required to precipitate the entire amount is calculated therefrom. If now one sixth to one eighth of this quantity of acid be added to the liquid, with constant stirring, the resinous substances altered by the action of the air are first precipitated, together with larger or smaller quantities of cresol and xylol. A further addition of acid precipitates chiefly cresol, and after a few trials it is generally possible so to adjust the quantity of acid that the third and last precipitation shall yield nearly pure carbolic acid, which crystallizes after a single distillation. As even a small quantity of water prevents its crystallization, it is necessary to remove this water completely by heating the carbolic acid nearly to the boiling point, while a stream of dry air is passed over it. The crystallization may be accelerated by cooling, or by the introduction of a small quantity of crystallized carbolic acid. Crude carbolic acid, such as is obtained from tar refineries, may be conveniently purified by treating it several times in succession with soda ley. The first extracts contain the purer product; the precipitation of the carbolic acid must, however, be preceded by dilution with water and exposure to the air. A perfectly pure product, remaining colorless when preserved, is obtained only when the substances which turn brown by oxidation have been completely removed by exposure to the air. Carbolic acid commonly contains a small quantity of a very disagreeably smelling sulphur compound (phenyl sulphide), which may be removed by distillation over a small quantity of lead oxide.—For the preparation of crystallized carbolic acid, Bickerdike ("Chemical News," xvi., p. 188) recommends that the commercial product, purified by one rectification, be dehydrated with one or two per cent. of anhydrous sulphate of copper. The distillate solidifies for the most part at 16° C., especially in contact with solid carbolic acid.

CARBON (Lat. *carbo*, coal; symbol, C), one of the most common and important substances in nature, occurring in a great variety of forms in the vegetable, animal, and mineral kingdoms, in the two first named being by far the most considerable element. The charcoal prepared from many substances belonging to these presents it pure; but the diamond is crystallized carbon, contaminated, when colorless, by no foreign admixture. In this form carbon possesses the most brilliant lustre, and a hardness unsurpassed, which is represented upon the mineralogical scale by the highest number, 10. (See DIAMOND.) Carbon is remarkable for its allotropic character, presenting itself under various forms while still in a state of purity. Besides those named, graphite may be regarded as one of its forms, the trace of other substances met with in its purest qualities be-

ing considered accidental; also gas carbon, the extremely hard substance which is deposited upon the inner surface of gas retorts; and lampblack, the soot deposited by highly combustible bodies, as they are imperfectly consumed. When one atom of carbon is combined with two atoms of oxygen, it forms the compound carbonic anhydride, commonly called carbonic acid gas, an essential constituent of solid limestones and other carbonates, and, in a gaseous form, of the atmospheric air. Its compounds with hydrogen are called hydrocarbons; they occur in gaseous, solid, and liquid forms. The chemical equivalent of carbon is 12, established by Dumas by the diamond, when consumed in a stream of oxygen gas, combining with this in the proportion of 12 parts to 32. Carbon resists the influence of many reagents which powerfully affect other bodies; acids and alkalis at ordinary temperatures have no effect upon it in its denser forms; but charcoal is oxidized in boiling nitric acid. Neither is it affected by the strongest heat attainable in furnaces, provided it be protected from the action of air or oxygen. Pieces of charcoal are found enclosed in the cinders of the blast furnace, which have been for 24 hours or more in the intense heat of its interior, among melting ores and limestones, but protected in some way from exposure to the oxygen of the blast. The only indications of volatilization or fusion which it can be made to exhibit, are seen by exposing it in a vacuum to the heat from a Bunsen's battery of several hundred pairs, so arranged in five or six series as to form 100 pairs of five or six times the ordinary size. It is then volatilized, and collects on the sides of the vessel in the form of a black crystalline powder. It is ultimately converted into graphite. Diamond is similarly affected. No substance, unless it be crystallized boron, is more unalterable in most conditions in which other bodies undergo a chemical change. It is taken up by some metals when these are fused in contact with it, and its presence in cast iron and steel imparts to them the qualities that distinguish them from malleable iron. In connection with the question of the volatility of carbon at high temperatures, Elsner has observed that when porcelain vessels are heated in the pottery furnace on trays made of a mixture of clay and graphite, they become brown-black throughout their mass, and covered with a light gray specular glaze. This result is attributed by him to volatilization of the carbon. Regnault, on the contrary, ascribes it to the formation of a hydrocarbon.—The most valuable qualities of carbon in practical uses are its strong affinity for oxygen at high temperatures, and its power of resisting in some of its forms the high heat of furnaces. The former quality gives to many of its varieties their value as combustibles (see FUEL), and it also renders carbon a most powerful reducing agent of the oxides of the metals; for which purpose, as well as for gener-

ating heat by its combustion, it is employed in smelting furnaces, bloomeries, &c. Its disappearance as carbonic acid gas adds greatly to the convenience of its use for this purpose. Its refractory character admirably adapts it as a material for crucibles; and when used in the form of paste of pure charcoal powder ground very finely, and applied as a lining to earthen crucibles, it serves not merely to protect the contents from injurious contact with the outer vessel, but also furnishes to these the best reducing agent or flux. The black lead crucibles or blue pots are in part composed of graphite, which, when prepared by grinding and mixing with refractory earths, powerfully resists even the action of the blast in highly heated furnaces. Other useful purposes served by carbon are considered in treating of the subjects in which this is the principal element, as **BONE BLACK, CHARCOAL, COAL, COKE, DIAMOND, FUEL, GRAPHITE, &c.**—The peculiar form of carbon already referred to as being found lining gas retorts, and collected in crevices in their interior, possesses a metallic lustre, and is of mammillary structure, resulting from the aggregation of the vesicles of which it is composed. It is sometimes fibrous, resembling graphite; its specific gravity is 1.76. Its hardness exceeds that of any other form of carbon, except the diamond. It is burned with difficulty in high heat when exposed to currents of air—a property which renders it useful for the illuminating points of the voltaic light. Its origin is commonly attributed to a deposition of carbon from olefiant gas, C_2H_4 , which is generated in the distillation of bituminous coal, and is converted by parting with one atom of carbon into marsh gas or the light carburetted hydrogen, CH_4 , used for illumination.—Carbon is, under certain circumstances, separated from cyanides in the form of graphite. This occurs at one stage of the soda ash manufactory according to the method of Le Blanc, and it is proposed to recover the shiny material separated in this way and apply it for the same purpose for which the natural graphite is used.

CARBON. I. An E. county of Pennsylvania; area, about 400 sq. m.; pop. in 1870, 28,144. It is a mountainous district, made up of parallel ridges running in a N. E. and S. W. direction. The largest of these is the Blue or Kittatinny mountain, which bounds the county on the S. E. Anthracite is the principal production of the county. The coal mines are in the smaller ridges N. W. of this. Of these, Mauch Chunk, at the eastern termination of the southern anthracite coal field, is the most important. At the top of Summit mountain the beds have been opened and worked like a quarry, the coal lying in a mass not less than 50 ft. thick. The Hazleton and Beaver Meadow mines are in the N. W. corner of the county. The coal is transported by railroads from the mines to the Lehigh river, and thence by slackwater navigation and canal, and also by the Lehigh Valley railroad, down the Le-

high to the Delaware river at Easton. The Lehigh river traverses the county across the line of its ridges; but the mines are only on its W. side, and from 6 to 10 m. or more distant. The yield of the mines in this county is about one sixth of the whole production of anthracite. The Lehigh Valley road, and branches to Mahanoy, Mount Carmel, Hazleton, and Audenried, traverse the county. The chief productions in 1870 were 18,646 bushels of wheat, 18,286 of rye, 55,037 of Indian corn, 62,493 of oats, 12,801 of buckwheat, 47,496 of potatoes, and 6,909 tons of hay; there were 885 horses, 1,316 milch cows, 1,121 other cattle, 515 sheep, and 1,943 swine. Capital, Manch Chunk. II. A central county of Wyoming territory, extending from Montana on the N. to Colorado on the S., intersected by the N. fork of the Platte river, and watered by the S. fork and by Powder and Tongue rivers; area, over 15,000 sq. m.; pop. in 1870, 1,368. The S. part is occupied by Medicine Bow mountains, and the central portion contains Black and Wind River mountains. Copper and paint ore are found, and coal and iron in the S. part, which is crossed by the Union Pacific railroad. Capital, Rawling's Springs.

CARBONARI (Ital. *carbonajo*, a charcoal burner), a secret political society, which became notorious in Italy and France about 1818, though it had existed for a number of years before. About 1810, when the Neapolitan republicans, alike opposed to the usurpation of Murat and the rule of Ferdinand, took refuge in the Abruzzi mountains, they organized, under the leadership of Capobianco, a carbonari society, adopting charcoal as a symbol of purification, with the motto "Revenge upon the wolves who devour the lambs." Queen Caroline of Naples and the Sardinian minister Maghella are mentioned, in addition to Capobianco, as the prime movers of the Abruzzi league of carbonari. In 1814 the little Neapolitan town of Lanciano, in the province of Abruzzo Citeriore, numbered as many as 2,000 carbonari, and all over the Abruzzi new societies were formed, whose political influence became so marked that Prince Moliterni was despatched to them by Ferdinand with a view of securing their coöperation against the French. But the carbonari, although their unwillingness to bear any foreign yoke had originally given rise to their association, leaned more and more toward republicanism; and, especially when the expelled dynasty was reinstated upon the throne of Naples, they assumed an attitude of uncompromising hostility against monarchy. From 30,000 members, the number of carbonari all over Italy had been swelled in one month (March, 1820) to the enormous figure of nearly 700,000, including many persons of education and good family. The place where the carbonari assembled was called the *baracca*, or collier's hut; the surrounding country was designated a forest; the interior of the baracca was called the *vendita*, from the sale of coals

which the colliers are supposed to carry on in their huts. Each province contained a large number of such *baracche* or huts, and the union of the different provincial huts constituted "a republic." The leading huts were called *alta vendita*, and had their headquarters at Naples and Salerno.—The growing influence of the order alarmed the conservative governments of Europe, especially the Bourbons, as, since 1819, the carbonari had allied themselves with French republicans. The trial of the Corsican Guerini, who, in accordance with the decree of the *alta vendita*, had stabbed a fellow member for having betrayed the secrets of the society, added to the excitement. Previous to 1819, the carbonari societies in France took their rise principally from the *charbonneries*, which flourished especially in Franche-Comté. But the movements of the Italian carbonari, especially the insurrections of 1820 and 1821 in Naples and Sardinia, gave a fresh impulse to the French fraternity, and under the auspices of Buchez and Flottard a new movement was set on foot in Paris. Men like Voyer d'Argenson, Lafayette, Lafitte, Dupont de l'Eure, Buonarrotti, Barthe, Teste, Boinvilliers, and other republicans of mark, joined the movement, which adopted the ritual of the Abruzzi carbonari, with the sole modification, that while the Neapolitans had only the one superior division of *alta vendita*, the French carbonari classed themselves in four *ventes*, viz.: *ventes particulières*, *ventes centrales*, *hautes ventes*, and *ventes suprêmes*. The admission to the *ventes* was also surrounded with greater formalities in France, although after admission the principle of equality prevailed, and, like the Italians, the French carbonari greeted each other as *bons cousins*. The statutes of the French carbonari were most stringent. The faintest whisper of the secrets of the society to outsiders constituted treason, and was punishable with death. No written communications were permitted. In 1819 there were about 20,000 carbonari in Paris. From September, 1820, to March 16, 1821, a separate committee sat in Paris on military affairs, as the army contained a large number of carbonari. In 1821 the government was officially informed that the society existed in 25 out of the 86 departments of France. The *congrès national* of the carbonari, which had its headquarters at Paris, seemed for a time omnipotent. All the insurrectionary movements from 1819 to 1822 were attributed to them. One of the cardinal points in the creed of the French carbonari was to make Paris the political focus of the world. After the July revolution of 1830, many carbonari gave in their allegiance to Louis Philippe; but at that time a new *charbonnerie démocratique* was founded by Buonarrotti upon the theories of Babeuf, which Teste, who was a prominent member, expounded in his *Projet d'une constitution républicaine*. The carbonari are not known to exist in France at present, at least not under that name.

CARBONATES, the combinations of carbonic acid with bases. These are very numerous, notwithstanding that the acid itself is one of the most feeble, and is easily expelled with effervescence by nearly all the other acids. Merely a red heat alone expels it from all the carbonates, except those of potassa, soda, lithia, barytes, and strontia; and the last two are decomposed by an intense white heat. In contact with charcoal heated to redness, all are decomposed, and a metal or an oxide is produced. The carbonates of ammonia, soda, and potassa alone are readily dissolved in water; the others are insoluble, or nearly so; but if free carbonic acid is present, their solubility is increased. The numerous and important class of salts formed by carbonic acid have till lately been regarded as monobasic; in which case they would contain one equivalent of the anhydride to one of the base. But in the case of the alkalies a second equivalent of the anhydride may be combined with the metallic oxide; thus with potash there is also a bicarbonate or acid carbonate. Owing to the existence of these salts, conjoined with a consideration of the properties of many of the compounds which carbonic anhydride forms with certain organic substances, the acid is now very generally regarded as dibasic, in which case its formula would be the double of that formerly adopted; carbonate of calcium would then be represented as CaCO_2 ; carbonate of potassium as K_2CO_2 ; and bicarbonate or the acid carbonate of potassium as KHCO_2 . The formulas of all the carbonates hitherto regarded as neutral would, upon this view, be doubled, while those of the acid carbonates and some of the double carbonates would retain their former value unchanged. The carbonates have considerable tendency to combine with each other and form double salts, like dolomite, which is a double carbonate of calcium and magnesium ($\text{MgCa}, 2\text{CO}_2$).—Among the most important carbonates are those of lime, potassa, soda, and ammonia, the last three of which will be found treated of under the names of their bases. Carbonate of lime, in its purest natural form, is the mineral calcareous spar. Chalk is also composed of it, and it is the principal ingredient in the limestones and marbles. So abundantly diffused is limestone among the strata that form the crust of the earth, that it has by some been supposed to constitute about one half of their substance. It is recognized by its moderate degree of hardness, being easily scratched with a knife to a white powder, whatever the color of the stone may be, and by its effervescing with acids. Heated to redness, its carbonic acid gas escapes, and quicklime remains. But it may be subjected to intense heat in strong close vessels, so that it may even be melted and still retain its original composition. Lamy has invented a pyrometer for the measurement of intense heat, founded upon this property of carbonate of lime to dissociate its carbonic acid at high temperatures,

to be again absorbed on cooling, the volume of the dissociated gas being used as the measure of the heat.—If M and M' represent the atom of any two metallic monads, such as potassium and sodium, the general formulas of the carbonates will be thus indicated: normal salt, $M_2\text{CO}_2$; acid salt, MHCO_2 ; double salt, $\text{MM}'\text{CO}_2$. The following table exhibits the composition of important carbonates, some of which will be described under their respective bases:

Carbonate of potassium.....	$\text{K}_2\text{CO}_3, \text{H}_2\text{O}$
Carbonate of sodium.....	$\text{Na}_2\text{CO}_3, 10\text{H}_2\text{O}$
Acid carbonate (bicarb.) of potassium.....	KHCO_3
Acid carbonate (bicarb.) of soda.....	NaHCO_3
Carbonate of calcium.....	CaCO_3
Carbonate of magnesium.....	MgCO_3
Dolomite.....	MgCaCO_3
Baryto-calcite.....	BaCaCO_3

CARBONDALE, a city of Luzerne co., Penn., on the Delaware and Hudson railroad, at the head of Lackawanna valley, and near the source of the Lackawanna river, 110 m. N. N. W. of Philadelphia; pop. in 1870, 6,393. The Lackawanna valley is extremely rich in beds of coal which in the vicinity of Carbondale are 20 ft. thick. The mines are worked by the Delaware and Hudson canal company, who take out annually about 900,000 tons. The coal is drawn up inclined planes by steam engines, to a height of 850 ft.; thence it is conveyed by railroad to Honesdale; and from Honesdale, by the Delaware and Hudson canal, to the Hudson river. The city was incorporated in 1851. It contains eight churches, a bank, a graded school, and a weekly newspaper.

CARBON DISULPHIDE (synonymes, bisulphide of carbon, sulpho-carbonic acid, sulpho-carbonic anhydride, sulphur alcohol, carburet of sulphur), a chemical compound of much value in the arts, prepared by burning carbon in an atmosphere of sulphur, or by distilling certain metallic sulphides, as pyrites, sulphide of antimony, and zinc blende, with charcoal. It was discovered by Lampadius at Freiberg in 1796, but was not proposed for practical use before the year 1844, when Mr. Jesse Fisher of Birmingham, England, suggested its adaptation to the extraction of oils from seeds and fatty bodies. Many tons of it are now annually manufactured, and it is fast becoming one of the most important technical products. Only two articles are involved in the manufacture of carbon disulphide, charcoal and sulphur. When we burn carbon in the air, the product is a gas, which we can with difficulty reduce to a liquid. When carbon is burned in the vapor of sulphur, a compound is obtained which condenses at once to a liquid; the former we write CO_2 , and call carbonic anhydride (carbon dioxide), and the latter CS_2 , and term sulpho-carbonic anhydride (carbon disulphide). The manufacture of carbon disulphide on a large scale is attended with as much danger from fire and explosion as the refining of petroleum, and it is more injurious to the health of the workmen on account of the poisonous properties of its vapor. It is usually stored in

large tanks of zinc, and protected from evaporation by a layer of water. The process of its manufacture is comparatively simple. Charcoal is heated to redness in a retort, and lumps of sulphur are dropped upon it; the sulphur is at once converted into vapor, and the charcoal burns in it as readily as it would in oxygen; the resulting compound is conducted into a condenser and run into suitable tight reservoirs. The charcoal must be dry, to prevent the formation of hydrogen sulphide and other fetid compounds. After the liquid has been repeatedly rectified by distillation, its odor becomes ethereal and no longer disagreeable. It is then absolutely colorless, and closely resembles alcohol. The percentage composition of carbon disulphide is: carbon, 15·8; sulphur, 84·2. It is a colorless, mobile liquid, of sp. gr. 1·268, boils at 46° C. (114° F.), and under ordinary circumstances does not freeze at -90° C.; if, however, a current of dry air be passed over its surface, producing rapid evaporation, the temperature sinks to -18° C., and a portion of the liquid is converted into a snowy solid. It does not combine with water, but mixes in all proportions with alcohol, ether, and similar hydrocarbons. It readily dissolves resins, oils, caoutchouc, gutta percha, camphor, sulphur, phosphorus, and iodine; is exceedingly inflammable, and burns, with a reddish blue flame, to sulphurous acid and carbonic acid. When mixed with oxygen or atmospheric air it forms an explosive compound. It has a high refracting power = 1·645.—Previous to 1850 the only technical application of carbon disulphide was for vulcanizing India rubber. It is now (1873) manufactured on an immense scale, and its uses are daily extending. It is employed to extract the fat from bones previous to their conversion into bone black; to dissolve the oil from seeds (olive, rape, turnip, cotton, linseed); to remove sulphur and bitumen from a certain class of rocks; to economize the oil contained in wool; to manufacture pure spices; for the purification of paraffine; for the preparation of liquid fire; in silver plating, a few drops in the bath adding to the brilliancy of the deposit; to destroy rats, weevils, moths, and vermin; as a motive power in engines; for the artificial production of cold; combined with oxygen, to produce an intense photographic light; for prisms of spectrosopes; to clean linen rags which have been used to wipe machinery; for the preservation of meat; to protect hides and furs in warm climates; to prepare sonorous wood and coal; to extract delicate perfumes; in the manufacture of ferrocyanide of potassium; in medicine, both internally and externally, as a diffusible stimulant, accelerating the pulse, augmenting the animal heat, and exciting the secretions of the skin, kidneys, &c.; also for rheumatism and indolent tumors. It is used both internally and externally. Some of these applications are now conducted on a large scale, especially the chemical method of extracting fat oils by carbon disulphide, instead

of the rude fat-boiling process so long in use. Carbon disulphide is frequently present in small quantities in illuminating gas, and imparts to the gas a disagreeable odor. The odor of crude carbon disulphide is intensely disgusting, like that of rotten cabbages.—Carbon monosulphide and carbon sesquisulphide have been prepared by chemists, but very little is known of them, and even their existence is sometimes questioned.—Carbon disulphide combines with the sulphides of the alkaline metals, forming a species of salts, called sulpho-carbonates, such for instance as the sulpho-carbonate of potassium, K_2CS_3 , which contains 3 atoms of sulphur in the place of the 8 atoms of oxygen in the corresponding carbonate, K_2CO_3 .

CARBONIC ACID GAS (synonymes, carbon dioxide, carbonic anhydride), a gas discovered in 1757 by Dr. Black, and called by him fixed air. He detected it in limestone and magnesia, from which he found it could be expelled by heat and the acids, and also noticed that it was produced by combustion, fermentation, and respiration. Lavoisier demonstrated its composition synthetically by burning carbon in oxygen, and obtaining this product. It was analyzed by Smithson Tennant, by causing it, as evolved from heated limestone, to be decomposed by the vapor of phosphorus passing over it; carbon was deposited in a light black powder, and the oxygen combined with the phosphorus. The composition of this gas is:

Carbon, 1 atom.....	= 12, or per cent.....	27·27
Oxygen, 2 atoms.....	= 32, "	72·73

Its chemical equivalent then = 44, and it is represented by the symbol CO_2 . The volume of the oxygen it contains is the same as that of the compound produced. Compared with air, its weight is as 1·529 to 1. It may be poured almost like water from one jar into another, displacing the air before mixing with it, as may be shown by its extinguishing a light placed in the lower vessel. It is without color, but has a decided sour taste, and a pungent odor. Its feeble acid reaction is shown in transiently changing litmus paper red. Flame is immediately extinguished when it is mixed with air in the proportion of 1 part to 4. Unmixed with air, it is entirely irrespirable; it is rejected with violent spasms of the glottis. In the atmosphere it is universally diffused in proportion exceeding 4 volumes in 10,000 by measure, even at the greatest height reached by man. It is this small quantity which furnishes to growing plants the carbon of their solid structures; and as the supply is diminished by this enormous absorption, the combustion and decay of organic bodies, and the respiration of animals, ever make good the deficiency. The great weight of this gas tends to keep it in the low places where it is generated, though, like other gases, it has also the tendency to mix with atmospheric air. Hence it is always prudent, before descending into badly ventilated wells, to let a candle

down to prove the presence or absence of the gas. It is related by Dr. Christison that cases have occurred of men becoming instantly insensible, even when the light burned. This may be owing to some peculiarity of the mixture of gases not understood, probably to the presence of carbonic oxide; for the writer has descended into air so impure that a candle could not possibly be lighted in it, and remained with another person long enough to make many ineffectual attempts to ignite it, and this with no other effect than a severe headache. In mines it is a very common thing for the men to continue their work in an atmosphere so foul that their candles go out, and are then relighted from the fire still in the wick, by swinging them quickly through the air, when they burn a little while and go out, and are again relighted in the same way. The son of Berthollet, the chemist, who destroyed himself by inhaling the fumes from burning charcoal, writing down his sensations at the time, remarked that the candle was soon extinguished. The lamp continued to burn, and was flickering as he became himself powerless to record more. Persons made insensible by inhaling this gas may be restored by immediately dashing cold water over them. This is the practice pursued at the famous Grotto del Cane at Naples, in order to restore the dogs which, for the gratification of visitors, are exposed to the fumes of the gas, into which they are dipped as into an insensible bath. Such natural accumulations of this gas are not very rare, though much that is evolved from the earth is absorbed by the waters it meets, some of which are almost as highly charged with it as the "mineral" waters of the shops. When the air of wells is too impure to enter, it may be driven out by the ordinary modes of ventilation, by agitating the column for some time in any way, by the explosion of powder, or, as suggested and practised by Prof. Hubbard, by lowering a vessel containing ignited charcoal nearly to the bottom. Incandescent coals have the property of absorbing many times their bulk of this gas, and when cooled they may be raised up, reignited, and lowered again. A well in which a candle would not burn within 26 feet of the bottom, was thus purified in the course of an afternoon.—Water readily absorbs carbonic acid gas, from which it may be freed by boiling, freezing, or being placed under the exhausted receiver of an air pump. Under the ordinary pressure of the atmosphere, and at a temperature of 60°, water takes up its own volume of the gas, and according as the pressure is increased, so is the bulk of the gas forced into the water. It gives a pungent, pleasant, slightly acid taste, and the sparkling effervescence seen in bottled liquors in which it has been generated. The gas obtained from powdered carbonate of lime or limestone, exposed to the action of hydrochloric or sulphuric acid, is used to saturate water for drinking. It is generated in strong metallic vessels, capable

of sustaining a pressure of four or five atmospheres or more. This is the "mineral water" or "soda water" of the apothecaries—both improper names, as it contains neither soda nor other mineral substance. Exposed to the air, the greater part of the gas soon escapes, and when thoroughly expelled by boiling, the water has an insipid taste. Pure lime water detects its presence in solution, becoming immediately turbid, as the lime seizes upon the gas, and is converted into an insoluble white carbonate. But if the gas is greatly in excess, a portion of this is redissolved. Not only is limestone soluble in water impregnated with this gas, but metallic bodies are also acted upon by it and converted into carbonates. As some of these are soluble and possess poisonous qualities, regard should always be had to this in the use of leaden pipes and vessels used for conveying and containing water, which by any means may be impregnated with the gas; and the copper gas generators of the druggists should especially be protected by a lining of tin, glass, or porcelain.—By subjecting carbonic acid gas to powerful pressure, Prof. Faraday succeeded in obtaining it in a liquid form. Thilorier repeated the experiments, and congealed the condensed gas into a solid form like snow. The pressure used for this purpose is that of 86 to 40 atmospheres. Sulphuric acid is made to react upon bicarbonate of soda in strong cast-iron cylinders, and the gas is passed through very small metallic pipes into a reservoir placed in a freezing mixture. In this it solidifies. In one of the early experiments of Thilorier, in a course of public lectures at Paris, the apparatus of cast iron exploded under the enormous pressure, and one of the assistants was so much injured that he died in a few hours. It was observed by Thilorier that when the liquid gas was allowed to escape into a brass box through a small tube, the cold produced by the sudden evaporation of one portion was so intense that it served to congeal the remainder of the gas. This snowy product, remelted and resolidified, becomes a clear crystalline solid like ice. Having a low conducting power, it is not so volatile as the liquid gas; and though its real temperature is more than 100° below the zero point of Fahrenheit's thermometer, it does not cause a strong sensation of cold. Mixed with ether and then evaporated under an exhausted receiver, the greatest degree of cold ever known was obtained by Prof. Faraday. The spirit thermometer sank to 166° below zero. With the control of such a congealing temperature and the application of pressures varying from 27 to 58 atmospheres, Prof. Faraday succeeded in converting several of the compound gases into liquids and colorless transparent solids. An illustration of the intense cold produced by the evaporation in the open air of the solid gas and ether is given in the freezing of ten pounds of mercury in less than eight minutes by contact with these substances upon its surface. A large

lump of the gas was kept for a minute in a red-hot crucible, and a pound of mercury was immediately afterward frozen with it. The vapor given off from the solid gas possesses a higher tension than that from any other substance; and, unlike the vapor from other bodies, it is developed by lowering instead of raising the temperature.—According to modern notation, carbonic acid gas is more properly to be called carbonic anhydride, or carbon dioxide. No definite hydrated carbonic acid is known, the anhydride, both in the form of gas and in its denser conditions of liquid and solid, being, as its name indicates, free from water; but it appears convertible into a true acid by solution in water, $\text{CO}_2 + \text{H}_2\text{O}$, yielding H_2CO_3 ; this in turn combines with bases to form the well known series of salts called carbonates. (See CARBONATES.)

CARBONIC OXIDE, or **Carbon Monoxide**, a gas containing one equivalent less of oxygen than carbon dioxide, being a combination of one equivalent each of carbon and oxygen—hence represented by the symbol CO . It contains 42.86 per cent. of carbon and 57.14 per cent. of oxygen. Its weight compared with air is 0.967. It is a product of imperfect combustion, and is generated in large fires in close furnaces in enormous quantities, mixed with carbonic acid gas and other gaseous products of combustion. By the introduction of atmospheric air to it while highly heated, it combines with another atom of oxygen, burning with a blue flame and becoming carbon dioxide. It is visible by night undergoing this change, as it meets the air when issuing from the tops of chimneys of large furnaces, indicating imperfect combustion within the furnace. In large iron establishments this gas is utilized by causing it to burn with the fresh air admitted under the boilers of the steam engines, or in the chambers constructed for heating the air blown into the furnaces. If the flow of the gases be obstructed, or in any way irregular, explosions may result by sudden admission of oxygen or of atmospheric air to them when highly heated. When mixed with pure oxygen, carbonic oxide is by the electric spark converted into carbon dioxide with an explosion. The oxide may be reobtained by passing the dioxide through tubes containing red-hot charcoal or metallic iron, which take up one atom of oxygen.—Carbonic oxide is a colorless gas, without smell or taste, but more irrespirable and poisonous than carbon dioxide. Its inhalation as it issues from furnaces sometimes causes immediate asphyxia to the workmen. It undergoes no change like carbonic acid gas under heavy pressures at the lowest temperatures; nor is it taken up by water like this gas, nor does it produce similar acid reactions in changing vegetable blues to red. Heat and electricity produce no change in it when alone; when mixed with carbonic acid gas, it may be separated and obtained pure by introducing quicklime or potash, which absorbs the higher

oxide. Carbonic oxide may be obtained with facility by heating oxalic acid with five or six times its weight of oil of vitriol, and absorbing the carbonic acid gas by quicklime, as stated above. Cuprous chloride gradually absorbs carbonic oxide if agitated with it.

CARBUNCLE, an unhealthy inflammation of the surface, accompanied by a sloughing of a circumscribed portion of the subcutaneous cellular tissue; of the same nature as a boil, only deeper seated and of larger size. It begins by a hard, tense swelling, of a livid and shining appearance, and with severe burning pain; it is generally accompanied by feverish symptoms, often of considerable severity, and is slow in its progress; in from one to three weeks the skin becomes thin and perforated by numerous openings, from which issues a thin whitish discharge; the ulcers finally unite into one of large size, at the bottom of which is seen a soft grayish mass, the slough of the cellular tissue, with a very disagreeable odor; this slough or core is soon separated, leaving a deep excavation, with thin edges, and surrounded by a livid skin. The swelling may vary in size from one to six inches in diameter, and is usually found upon the back, nape of the neck, and nates; it may occur also on the shoulders, chest, lower jaw, and lower extremities. It is most common in adults and old persons whose constitutions have been broken down by intemperance, exposure, hard study, or mental anxiety; it is always an evidence of a vitiated state of the blood and of derangement of the digestive organs. If of large size, in an enfeebled constitution, or on or near the head, a carbuncle may endanger life. The local treatment which has been found the best is to make free incisions into the tumor, to allow the escape of the discharge and sloughs, to relieve the engorged tissues by the loss of blood, and to excite them to healthy suppuration and granulation; warm and stimulating poultices, ointments, and lotions hasten the cure. At the same time the diseased secretions of the alimentary canal should be removed by purgatives; the strength supported by nourishing diet, bark, and the mineral acids; irritability calmed by small doses of opium; and the blood renovated by a judicious exhibition of preparations of iron.

CARBUNCLE, in mineralogy, the name of a precious stone much valued by the ancients, said by some to be the ruby, while others regard it as the garnet. The Latin name *carbunculus*, like the term ruby, seems to have been applied to very different minerals, and may have comprehended the red sapphire, or oriental ruby, the spinelle ruby, the red topaz, and the red garnet.

CARBURETS, or **Carbides**, combinations of carbon with the other elements. Cast iron, being a mixture of carbon with iron, is called carburet of iron. For carburet of sulphur see CARBON DISULPHIDE.

CARBURETTED HYDROGEN, the name of two compounds of carbon and hydrogen, one dis-

tinguished as light carburetted hydrogen, and the other as olefiant gas. The former is the fire damp of miners, also called marsh gas, &c. It was observed in coal mines as early as 1640. Dr. Franklin in 1774 called the attention of Priestley to an inflammable gas obtained in this country by stirring stagnant pools. It was first accurately described by Drs. Dalton and Thomson in 1811. It is a colorless gas, without taste or smell, and neither of acid nor alkaline properties. Its composition is: carbon 1 atom, hydrogen 4 atoms, CH_4 ; or per cent., C=75, H=25. Its weight, compared with that of air, is 0.555. Burning bodies immersed in it are extinguished, and it does not support respiration. It is highly inflammable, burning with a yellow flame; but it requires a high heat to ignite it. United with oxygen or atmospheric air in due proportion, a compound is produced which explodes with the electric spark or the approach of flame. The mixture of air to produce an explosion may be from 7 to 14 times that of the gas. Water and carbonic acid gas result from the chemical change. In mines of bituminous coal this gas is generated abundantly, and it also issues from the earth in various parts of the world. The burning springs of Baku have already been noticed in the description of that place. Similar springs are met with in western New York, Pennsylvania, and Virginia; and the gas from some of these is used for illuminating purposes. The principal interest that attaches to this gas is owing to the terrible explosions it has caused in the English coal mines, which led Sir Humphry Davy and George Stephenson to investigate its properties with a view of discovering some method of protecting the miners. Thus the safety lamp was discovered, which still continues to be the most valuable guard next to thorough ventilation.—Olefiant gas, the other variety of carburetted hydrogen, was discovered by some Dutch chemists in 1796, who gave it this name in consequence of its forming an oil-like liquid with chlorine. It consists of 85.71 per cent. of carbon and 14.29 of hydrogen, and is properly represented by the symbol C_2H_4 . Its specific gravity is very near that of atmospheric air, being estimated at 0.967. The gas possesses an odor slightly ethereal. Burning bodies are extinguished and animals cease to breathe in it. It burns with a dense white light. Mixed with three or four volumes of oxygen or 10 or 12 of air, it violently explodes by the electric spark or flame. Exposed to red heat in a porcelain tube, it is decomposed, charcoal is deposited, and light carburetted hydrogen or hydrogen remains. A succession of electric sparks convert it into charcoal and hydrogen, the latter occupying twice the original bulk of the gas. It is liquefied under the pressure of 40 atmospheres, when exposed to the low temperatures attained by solid carbonic acid and ether in a vacuum. In this form it is a clear, colorless, transparent fluid. Several methods are given for obtaining

it. It results from distilling coal or fat substances in close vessels. Alcohol distilled with four to seven times as much sulphuric acid yields it, and the gas is purified by passing it through lime water.

CARBURIS, *Marino*, count, a Greek engineer, born at Argostoli, Cephalonia, at the beginning of the 18th century, died there in 1782. He was educated at the university of Bologna. Banished for some folly from Greece, he entered the Russian service under the name of Lascaris. The empress Catharine II. appointed him lieutenant colonel of the corps of engineers, and intrusted him with the construction of the work connected with the statue intended for Peter the Great. Carburis procured a monolith consisting of a block of granite from the gulf of Finland, 21 ft. high, 40 ft. long, and 27 ft. wide. He invented a mechanical apparatus for removing this to St. Petersburg, which was afterward at the request of the French government placed in the *conservatoire des arts et métiers*. He afterward settled in Cephalonia, and experimented in the cultivation of indigo and in the growth of sugar and American cotton for about four years, when he was assassinated by some Laconian laborers.

CARCAJENTE, a town of Spain, in the province and 28 m. S. S. W. of Valencia, in a beautiful plain on the Jucar; pop. about 9,000. It is handsome and prosperous, and has several linen and woollen manufactures. Many Roman remains have been discovered in its vicinity. The chief trade is in silks, oranges, and pomegranates.

CARCASSONNE (anc. *Carcaso*), a city of Languedoc, France, capital of the department of Aude, 50 m. S. E. of Toulouse, on the river Aude; pop. in 1866, 22,173. The river divides it into two parts, the old city and the new, joined by a bridge of 10 arches. The new town is well built, with broad streets intersecting each other at right angles. It is an important manufacturing and commercial centre, and contains large woollen factories,



Carcassonne.

producing a fine cloth, highly esteemed for its brilliant dyes, which is especially exported to the Levant, Barbary, and South America. Trade is carried on in grain, wines, fruit, and

leather. No place in France has preserved to a greater extent the aspect of a fortress of the middle ages than the old town or *citté*, which is quite distinct from the new and is almost deserted. It is enclosed by double walls, flanked with towers, and protected by a strong castle. —Carcaso was the chief town of the Volcæ Tectosages, who were conquered by the Romans. The Visigoths probably built the inner line of the walls, and part of the castle. These fortifications, however, did not prevent the storming of the town by the Saracens. From the 9th century till 1247 Carcassonne was governed by its own counts. In 1209, in the crusade against the Albigenses, it was taken by Simon de Montfort after a severe siege, and 450 of the inhabitants, who refused to abjure their heresy, were burned. In 1262 it suffered severely in a revolt against the king. In the church of St. Nazaire is the tomb of Simon de Montfort.

CARDAMOM, a name rather vaguely applied in commerce to the aromatic seeds of various East India plants, of the natural order *zingiberaceæ*. The *βρωμον* of Dioscorides and *amomi uva* of Pliny is probably the round cardamom of Sumatra, Java, &c., the fruit of *amomum cardamomum* (Willdenow's Linn.). The variety from Madagascar is known as the great carda-



Renealmia cardamomum.

mom, but other varieties from Java and Ceylon are also called by the same name by some authorities. The cardamom of the pharmacopœias, and the best known in this country, is that from Malabar. It is the product of the *renealmia cardamomum* of Roscoe, a perennial plant with a tuberous root, growing wild in the mountains, and cultivated by the natives. The seeds are exported in their capsules, which are also aromatic, but are not used in medicine. Cardamom seeds are valued for their aromatic and pungent qualities, and are much used to flavor various medicines and cordials. The natives of the East use them as a condiment. One variety, known as grains of paradise, Guinea grains, and Malagueta pepper, is imported in seeds from Guinea, and also from Demerara, where the negroes have intro-

duced and now cultivate it. The plant is probably the *amomum Melegueta* of Roscoe, though one of the varieties found in the English markets is from the *A. grana paradisi* of Sir J. E.



Amomum grana paradisi.

Smith. The negroes use the seeds as seasoning for food, and in Africa they are highly esteemed among spices. Their flavor is highly pungent and peppery. In England they are extensively used for giving a factitious strength to adulterated gin and other liquors, and frequently appear as one of the ingredients of the so-called "gin flavorings." (See GIN.) They are also administered as medicine in veterinary practice. Cardamom enters into the composition of the *puleio aromaticus*, and is also used in medicine in the form of tincture.

CARDAN, Jerome (GIROLAMO CARDANO), an Italian scholar and physician, born at Pavia, or according to some authorities at Milan, Sept. 24, 1501, died in Rome, Sept. 21, 1576. He was the illegitimate son of a distinguished scholar of Milan, Facio Cardano. At the age of 22 he acquired no little distinction by lectures on mathematics and metaphysics, and by his remarkable attainments in the study of the sciences. He resided alternately in Milan, Venice, and Padua till 1533, when he was appointed professor of mathematics in Milan, and a few years later of medicine in Pavia. Difficulties with regard to his salary soon caused him to return to Milan, where he enjoyed at this period a considerable fame. Shortly after his return he published his mathematical treatise, *Ars Magna*, and in 1550 his *De Subtilitate*, both adding greatly to his reputation, which was thus far grounded on actual desert. The king of Denmark made him an offer of a large annuity if he would reside at his court, but Cardan refused, and continued to lecture and practise medicine, rendering valuable services to the cause of science, and enjoying a popularity which was apparently rapidly increasing. But he now began that extraordinary career of vice, eccen-

tricity, and quackery with which his name is connected, and which is principally known to us through his own works. In 1552 he was called to Scotland by John Hamilton, archbishop of St. Andrews, to attend him for an illness with which he had been long afflicted. He succeeded, though apparently by mere good fortune, in effecting a cure, and was largely rewarded. In returning he drew the horoscope of Edward VI., prophesying for him a long life; but Edward died the year after, and Cardan found himself everywhere ridiculed, in spite of his attempted explanations. After travelling for ten months through the principal countries of Europe, he returned to Milan, where he lived a life of debauchery and extravagance that soon reduced him to absolute penury, in spite of his efforts to repair his fortunes by gambling. His two sons followed the example of his vices; the elder was executed for the murder of his wife; the younger led a life which compelled even his father to abandon him. The various quackeries which Cardan practised during this period are innumerable; among them were magic and astrology, with pretended methods of cure, which, however, brought him few advantages. He took the greatest pride in his many eccentricities, and in considering himself different in constitution and composition from other men. He pretended that he was accompanied by a familiar spirit, and ruled by peculiar fates. In spite of his manner of life, he was called to Pavia in 1560, and in 1562 to Bologna, through the influence of friends, and was a professor in the latter city from 1562 to 1570; but he continued in his former habits, and involved himself in many difficulties from which he escaped by going to Rome, where he ended his life as a pensioner of Pope Gregory XIII.—Cardan's works present that singular mingling of learning and absurdity which might be expected from the history of his life. He is said to have written 222 separate treatises besides his autobiography (*De Vita Propria*). The chief of these are the works already named, his mathematical essays, and his *De Rerum Varietate*, a supplement to the treatise *De Subtilitate*. The best edition of Cardan's complete works is that of Lyons, *Hieronimi Cardani Mediolanensis Philosophi ac Medici celeberrimi Opera omnia, Cura Car. Sponii* (10 vols. fol., 1663).

CARDENAS, a maritime city of Cuba, capital of the civil district of its own name, in the Western department, 103 m. E. of Havana; pop. about 11,000, comprising 7,700 whites, 500 free negroes, and 2,800 slaves. This city, situated in one of the finest sugar-producing districts in the West Indies, was founded in 1828; but it has grown so rapidly as to be at present one of the principal commercial centres of the island. The streets are broad, regularly laid out, and lighted with gas; a spacious square in the centre is embellished with a bronze statue of Columbus; and the houses, a number of which

have two stories, are neat, well built, and solid. The port, protected by a neck of land stretching N. W. of the city, though shallow, is commodious, and is much frequented by shipping, the loading of which is facilitated by a number of good wharves, extending for the most part a long distance from the shore. Cardenas is the headquarters of the military district; it is connected by rail with Havana and Matanzas in one direction, and with Yucaro in the opposite direction; and several lines of steamers and coasting vessels ply to various other points. A large proportion of the mercantile community are Americans, to whom the place is said mainly to owe its importance; whence it is commonly called the "American city." The chief exports are sugar, molasses, and some coffee, of the first of which commodities 115,000 boxes are on an average furnished annually from a single one of the surrounding plantations.

CARDI, Ludovico, called also **CIGOLI**, a Florentine painter, born at the castle of Cigoli, in Tuscany, in 1559, died in Rome in 1613. He was the pupil of Santo di Titi, but was indebted for his success to a careful study of the works of Correggio. His "St. Peter healing the Lame," now destroyed, was regarded as inferior only to the "Transfiguration" of Raphael. His other most esteemed pictures are "St. Jerome" and the "Conversion of St. Paul" at Rome, the "Martyrdom of St. Stephen," the "Trinity," "Mary Magdalene," and the "Ecce Homo," at Florence. He enjoyed a considerable reputation also as an architect, and designed the fine Renuccini palace at Florence, as well as many palaces and public edifices there and at Rome; he excelled also in some degree as an engraver, and published a treatise on perspective.

CARDIFF, the county town of Glamorganshire, Wales, on the river Taff, near its entrance into the Severn, 22 m. W. of Bristol; pop. in 1871, 39,875. At the beginning of this century Cardiff was a mere village; but the construction of a fine dock by the marquis of Bute, a large local proprietor, and the consequent trade from the collieries of South Wales, converted it into an important commercial town. It is now the principal shipping port of the Welsh steam coal, besides iron, slates, and other local products. The Glamorganshire canal and the Taff railway terminate here, and the facilities for commerce have been greatly extended by the construction of a ship canal between the harbor and the town. In 1870 the exports amounted to £3,106,571, and the imports to £593,605. The greater part of the town is modern, and consists of good buildings, including two fine churches and several other places of worship, an infirmary hospital, a union workhouse, and a town hall 175 ft. long, in the Italian style. There is an ancient castle, which has been converted into a modern mansion, and is now in possession of the marquis of Bute.



Cardiff, from the Castle. (See p. 773.)

CARDIGAN (called by the Welsh *Aberteify*), a seaport, municipal and parliamentary borough, and the chief town of Cardiganshire, Wales, on the right bank of the river Teify, at the commencement of its wide estuary, 8 m. from the sea, 195 m. W. by N. of London; pop. in 1871, 3,585. Ruins of old fortifications still stand in the immediate vicinity of the town, and on a hill commanding the river is the ancient castle of Cardigan, begun by Gilbert de Clare about 1160, with two towers and a wall still standing. An ancient bridge crosses the river opposite the town. Owing to obstructions in the harbor, only vessels of light tonnage can come up to the wharves at most seasons of the year. The chief exports are oats, butter, and slates. In 1864 the inhabitants owned 118 sailing vessels under and 69 sailing vessels over 50 tons. The salmon and herring fisheries are of some importance.

CARDIGAN, **James Thomas Brudenell**, seventh earl of, a British general, born at Hambleton, Oct. 16, 1797, died at Deene Park, Northamptonshire, March 28, 1868. He was educated at Christ Church, Oxford, and entered the army May 6, 1824, as cornet in the 8th royal Irish hussars, under the courtesy title of Lord Brudenell. His family influence and wealth in England procured for him rapid promotion, and on Dec. 3, 1830, he was made lieutenant colonel of the 15th hussars. He was soon after tried by court martial on a charge of tyranny and espionage made by the major of the regiment, and removed from active service. In March, 1832, he was restored to the service, being appointed lieutenant colonel of the 11th hussars. Lord Brudenell was a member of the house of commons from the period of his coming of age in 1818 till August, 1837, when on the death of his father he became earl of Cardigan. He retained the command of his regiment, and became involved in quarrels with several of his subordinates. In 1840 he fought a duel with Capt. Tuckett, who had censured his con-

duct in a newspaper. Capt. Tuckett was wounded, and Lord Cardigan was tried before the house of lords and acquitted, but public opinion was against him. His reputation, however, as an accomplished cavalry officer, and the satisfaction which the duke of Wellington expressed in 1848 with the efficiency of his regiment, led to his promotion. On the outbreak of the Crimean war Lord Cardigan was raised to the rank of major general, and appointed brigadier in command of the light cavalry brigade. This brigade constituted the celebrated "six hundred" who were led by Lord Cardigan in the "death charge" at Balaclava, Oct. 25, 1854. On that occasion he is said to have received from Lord Lucan, his brother-in-law, an order to capture certain guns from the Russians. A mile and a half had to be traversed under fire before the enemy could be met, and the Russian forces stood in formidable array in every direction. The enterprise seemed hopeless. Cardigan, however, led on the charge and actually took the guns, his men cutting their way through the infantry support and through the cavalry, and then back again, under the play of the Russian batteries, but with fearfully diminished numbers, nearly three fourths having fallen. As the hero of this daring exploit, Lord Cardigan was received with great enthusiasm on his return to England, was created a K. C. B., and appointed inspector general of the cavalry, which post he held from 1855 to 1860. In August, 1859, he was made colonel of the 5th dragoon guards; in August, 1860, colonel of the 11th regiment, or Prince Albert's own hussars; and in February, 1861, lieutenant general. He died in consequence of being thrown from his horse.

CARDIGANSHIRE, a maritime county of South Wales, bordering on Cardigan bay; area, 698 sq. m.; pop. in 1871, 73,488. The county is mountainous, except in the N. E. near the sea, where it is flat. The rivers are small, the principal being the Teify, Ystwith, and Dody, and

there are several small lakes. Slate is the prevailing geological feature of the county. Veins of copper, lead, and zinc are found. Some domestic manufactures of woollen are carried on; oats, butter, cattle, sheep, woollens, and slates are exported. Remains of castles and religious houses are frequent, as are druidical remains and Roman encampments. Capital, Cardigan.

CARDINAL (Lat. *cardinalis*, principal or chief), originally, any clergyman bearing an official appointment in a principal church. By degrees, however, the title became the exclusive designation of the principal clergy of the Roman church, who, as the natural counsellors of the pope, acquired an influence and consideration of a superior kind. Thus, in process of time, an ecclesiastical senate was formed to advise and assist the sovereign pontiff in the government of the church; and the constitution of this body was continually perfected until it was ultimately fixed in its present form by Pope Sixtus V. (1585-'90). The dignity of cardinal is the highest in the Latin church after that of pope, who is elected by the assembled body of cardinals. (See CONCLAVE.) Cardinals have also the rank of secular princes, being classed with electors, and next after kings. Their insignia (besides those worn by bishops, which all cardinals, even those who are not in sacred orders, are entitled to use) are a purple mantle, a scarlet hat, and a ring of sapphire set in gold. They are divided into three classes, cardinal bishops, cardinal priests, and cardinal deacons; and the maximum number of these classes is respectively 6, 50, and 14. The first class, when full, consists of the bishops of the six suffragan sees of the former States of the Church, Ostia, Porto, Albano, Tusculum, Sabina, and Palestrina. Their title arose from the circumstance that they were obliged to officiate pontifically on certain days in the greater basilicas of Rome, and were inaugurated or incardinated (*incardinati*) into these functions, and hence ranked as the chief of the cardinals, who were, as stated above, the clergy of these principal churches. The cardinal priests were originally the arch priests who presided over the clergy attached to the principal churches, of which there were already 25 at the close of the 5th century. The cardinal deacons sprung from the regionary deacons, of whom there were originally 7 and afterward 14, each one having charge over the poor in a certain district of the city. In modern times the cardinal priests are very frequently archbishops and bishops. Each one, however, derives his title from a particular church, and in that church he has special jurisdiction. The cardinal deacons may be priests, deacons, or subdeacons, or merely in minor orders. They are generally men who have devoted their lives to the study of law, diplomacy, and statesmanship, and are employed in the temporal affairs of the Roman court. Every cardinal, whatever order he may have received, exercises quasi-episcopal jurisdiction in his church, gives solemn benediction, and issues

dispensations. Those who are priests can give the tonsure and minor orders. They take precedence of all prelates, even patriarchs, and have a decisive voice in general councils. The appointment of a cardinal rests exclusively with the pope. The number is never quite filled, and there are always some reserved *in petto*, to be announced when a death occurs or any other suitable opportunity presents itself. In accordance with stipulations entered into at different times, the pope appoints a few cardinals recommended by the principal Catholic sovereigns, who are called crown cardinals. The decrees of the council of Trent and the constitutions of Sixtus V. direct that the cardinals should be selected as far as possible from all nations. The reasons of this direction are evident; for, as the pope exercises supreme authority over so many national churches in different parts of the world, he needs the advice of wise and learned men from all civilized countries in order to give a truly catholic character to his administration. On Jan. 1, 1873, there were 47 cardinals, leaving 28 vacancies. There were 4 cardinal bishops, all born in Italy; 36 cardinal priests, of whom 25 were born in Italy, 5 in France, 3 in Germany, 1 in Spain, 1 in Ireland, and 1 in Guatemala; and 7 cardinal deacons, all born in Italy. Of these 47 cardinals, 38 were appointed by Pope Pius IX. The oldest was the cardinal priest Alexander Biliot, archbishop of Chambéry, born in 1788, appointed in 1861; the youngest, the cardinal priest Lucien Bonaparte, born in 1828, appointed in 1868. There were 19 more than 70 years of age, 19 between 60 and 70, 5 between 50 and 60, and 4 between 40 and 50.

CARDINAL BIRD, or **Cardinal Grosbeak**, a bird of the finch family (*cardinalis Virginianus*, Bonap.). It has a very large bill, moderate wings, and a graduated tail longer than the



Cardinal Bird (*Cardinalis Virginianus*).

wings; the length is 8½ inches; the bill red; the crown surmounted by a flattened erectile crest, about an inch long; the general color bright vermillion red, darkest on the back,

rump, and tail; a narrow band around the base of the bill, the chin, and upper part of the throat, black. The female is light olive above, with a yellowish tinge on the head, and brownish yellow below and on the sides; the tail, wings, and crest have a dull red color. It is found in the southern states as far west as Missouri, and probably along the Rio Grande to the Rocky mountains. This is one of our most highly prized cage birds, on account of its color, vivacity, strength and variety of song, and ease of keeping; numbers have been carried to Europe, and in England they are called Virginia nightingales, a name to which Latham says they are fully entitled from the clearness and excellence of their notes; they sing from March to September, and are said by Wilson to be most lively in wet weather; they are often called red birds. The males when confined together fight violently, and will try to attack their own images reflected in a mirror; the females are often nearly as good singers as the males. Their food consists chiefly of maize, and the seeds of various fruits; they are said to destroy bees. There are other species of these beautiful songsters in Central America and in the northern parts of South America. The nests are made of twigs, weeds, and vines, lined with finer materials, and are placed in a holly or laurel bush; the eggs are four, of a dull white color, with numerous markings of brownish olive.

CARDINAL VIRTUES, those moral virtues which are regarded as being the basis of, and involved in greater or less degree in, all right action; so named from *cardo*, a hinge, as denoting the fundamental point on which all things turn. Of these the ancients reckoned four, representing the four principal divisions of the circle which a hinge describes. These four were justice, prudence, temperance, and fortitude.

CARDROSS, a town of Dumbartonshire, Scotland, on the Clyde, 4 m. N. W. of Dumbarton; pop. about 8,000. It has bleacheries and cotton manufactories, and is celebrated for its Castle hill, the name given to the site where once stood the castle which Robert Bruce built, and where he died, June 7, 1329.

CARDS, in cloth manufacture, combs of a peculiar construction, which serve to disengage the fibres of an entangled mass and lay them parallel. Every fibre on the card is doubled up, and they are afterward extended by an operation called drawing and doubling. Cards are made by inserting in a piece of leather fine wires projecting about a quarter of an inch from the leather, and all slightly bent the same way. These small hooks are prevented from turning by being made in pairs. Two of them are made of a piece of wire bent like the three sides of a square; this is inserted through two holes in the leather, and the two projecting ends are bent in the same direction. The leather, bristling with hooks, is attached to a flat or cylindrical surface. A card is an instrument in which two such surfaces are opposed,

and made to move at a very small distance from each other; the cotton or wool to be disentangled is placed between them. The cards opposed to each other are placed in different positions according to the result to be obtained. At first the hooks are placed in opposite directions, so that at each stroke some of the fibres of the tuft are hooked on one card and some on the other; this is called the tearing position. After all the fibres are hooked on, one of the cards is reversed, and at the next stroke the card which moves in the direction pointed out by its own hooks strips from the other all the fibres; this is called the stripping position. Flat cards have been used by hand in the manner just described. Cylinder cards and the carding machine were invented in the 18th century by Lewis Paul of Northampton, England, and were much improved by Sir Richard Arkwright. This machine operates as follows: The wool or cotton to be carded, after being arranged in the shape of a sheet in another machine, is engaged between the feed rollers. The fibres are taken off by the drum and carried to the large runner, which takes off the loose fibres, and is stripped of them by the small roller, which returns them to the drum. The drum carries them anew to the large runner, but they are hooked more firmly and move onward to the top cards; some of them remain there, and the others are completely extended and reach the doffer, which takes off a portion of them; these are stripped from it by the doffer knife and form the fleece; the others are carried round again to the runners and top cards. At each passage some are taken off. From time to time the top cards and cylinders are cleaned of the fibres accumulated in their teeth.—The machine for making cards was the invention of Amos Whittimore, of Cambridge, Mass., for which he took a patent in 1797. An English patent was issued in 1811 to J. C. Dyer. A fillet of leather is prepared of equal thickness throughout by drawing it between a cylinder and a scraper, which takes off all inequalities. One end of the fillet is then placed between two feed cylinders, and is guided laterally by rollers. These are acted upon at intervals, and each time they move they carry the fillet sideways the distance between two hooks. When it is necessary to place the hooks in oblique lines, the motion described is combined with a motion of the feed rollers. After each motion of the fillet of leather, a fork brought down at the proper angle pierces two holes in the leather; a piece of a hard-drawn steel wire is fed in; a small block of steel descending upon it holds it firmly; the wire is cut off; two sliding pieces of metal bend it up against the sides of the block, and the points are pressed into the holes in the leather. The blocks and other parts spoken of recede out of the way, and other parts come forward to drive the staple in and bend it to the required angle. All these operations are effected by means of rotary cams acting upon

the ends of levers or of rods, some by their periphery, some by their sides, as is usual in machines for manufacturing small objects which require to be submitted to numerous and complex motions.—Numerous patents have been granted by the United States for improvements in cards, carding machines, and card making. (See COTTON MANUFACTURE.)

CARDS, Manufacture of. Playing and address cards are prepared from cardboards, made by pasting a sheet of cartridge paper between two sheets of white or colored paper; or for ornamented backs, sheets may be printed with the intended design. Cardboards of extra thickness may have two or more sheets of cartridge paper interposed. As ordinarily made, the first process, called mingling, is arranging a sheet of cartridge paper between each pair of sheets in a ream of white demy paper. The pile thus made is called a head. Placed on a table at the left hand of the paster, he draws down the top sheet, and brushes it over with paste; then the cartridge paper, drawn down on the pasted surface, is treated in the same way, and its surface is immediately covered with two sheets drawn down at once upon it. The upper one is pasted for the next cartridge paper, and so on till the head is again made up. It is then subjected to the action of a powerful hydraulic press, by which the water is expelled from the sheets. Removed from this, each outside pair is successively taken off, one board at each end of a copper wire, and suspended on lines 24 hours in a heated room to dry. The boards are then passed between stiff cylinder brushes, by which they are well rubbed and partially polished. They may next be varnished on the side intended for the backs, thus making them water-proof and less likely to be soiled. They are then rolled between a warm iron and a paper roller, as in the process of calendering, next between two polished iron rollers, next with smooth sheets of copper interposed between the cardboards, and finally they are subjected to a pressure of 800 tons. The boards are thus made straight and even, and receive a finely polished glazed surface. If not intended for playing cards, they may now be cut into the required sizes of address cards. To be enamelled, they receive an application of china white, or silver white (a very pure variety of white lead), which is first mixed with water containing some fine size, made from parchment cuttings boiled down. This application, being smoothed over with a badger's hair brush, is first dried, then rubbed over with flannel dipped in powdered talc, and finally polished with a close-set brush.—The old way of painting playing cards was by the use of stencil plates, with openings corresponding to the spots, each plate comprising many cards, so as to cover a cardboard. Through these openings the color was introduced with a brush. The court or face cards required a stencil for each color, one being applied and

then another, the open spaces in each being where the color used with it belonged. The operations somewhat resemble the printing of colors on cloth. A cardboard, when thus painted, was cut up into its separate cards. Printing has succeeded to the use of the stencil, and the process in use for applying different colors is by blocks, essentially the same as those of the calico printer. The English manufacturers receive the print of the ace of spades from the stamp office, this being the duty card, costing the manufacturers 1s. sterling. But if the cards are for exportation, no duty is required, and the duty card in this case bears a printed notice, forbidding its use in Great Britain and Ireland, under a penalty of £20.

CARDS, Playing. Like the game of chess, cards are supposed to be of Asiatic origin, and indeed seem to have been based upon the same warlike associations, some of the figures of chess having appeared also in the cards used



Hindoo Cards, reduced—King and Vizier.

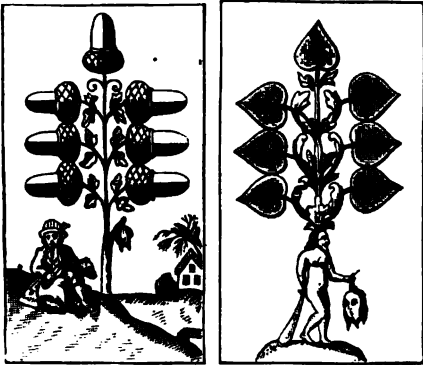
in the Orient. In Hindostan cards were called *tehatar-tass*, signifying four crowns or four kings, the popular name being *taj* or *tas*. There is no queen, the court suits being the king and his vizier. The king is variously represented, but the distinguishing mark is the royal umbrella over his head. The vizier is



Chinese Cards.

mounted, sometimes on a horse, sometimes on a camel, sometimes on a tiger. The Chinese call their cards *che-pao* or paper tickets; they have 30 cards in a pack, 3 suits of 9 cards

each, and 3 single cards which are superior to all the others.—The most ancient form of cards is still preserved in the figures of the cards used in the French game of *tarots*. This name is derived from the Arabic, and the game was originally connected with religious, necromantic, and scientific associations. The ancient terms for cards, as *naypes* in Spain and *naibi* in Italy, are also of Arabic etymology, and signify fortune-telling. In all probability, cards were introduced into Europe by Arabs, Jews, and other oriental races, before the 13th century, the Saracens especially having made the game popular in Spain and Italy, whence the taste for it spread into Germany, France, and England. The first historical evidence of its existence in Germany is in the *Stadtbuch* of



Old German Cards—Seven of Clubs and Seven of Hearts.

Augsburg of 1275, where it is stated that "Rudolph I. amused himself with playing cards and other games." The use of cards in Italy is mentioned as early as 1299. The first authentic record in France occurs in 1393. As early as the 15th century an active trade in cards sprung up in Germany, and was chiefly carried on at Nuremberg, Augsburg, and Ulm, the demand from France, England, Italy, Spain, and other countries, producing great prosperity among the manufacturers. The most eminent manufacturer of cards in France in the 16th century was Jean Volay. In England the manufacture of cards flourished especially under Elizabeth. But no sooner had cards come to be generally used in Europe than they were prohibited by several governments, partly from moral considerations, the first games, as *Landsknecht* in Germany, *lansquenot* and *piquet* in France, being games of chance; partly from considerations of political economy, as in England, where the importation of foreign cards was considered injurious to the prosperity of home manufacturers. The prohibition, however, only tended to increase the taste for cards. In England, under Richard III. and Henry VII., card playing grew in favor. The latter monarch was very fond of the game, and his daughter Margaret was found playing cards by James IV. of Scotland

when he came to woo her. The popularity which cards gradually obtained in England may be inferred from the fact that political pamphlets under the name of "Bloody Games of Cards," and kindred titles, appeared at the commencement of the civil war against Charles I. One of the most striking publications of this kind was one in 1660 on the royal game of ombre. In "Pepys's Diary," under the date of Feb. 17, 1667, it is stated that on Sabbath evenings he found "the queene, the duchesse of York, and another or two, at cards, with the rooms full of ladies and great men."—The marks upon the suits of cards are supposed to have been originally intended for a symbolical representation of the four different classes of society, hearts representing, according to this supposition, the clergy, spades the nobility (Ital. *spada*, a sword), clubs the serfs, and diamonds the citizens. The figures originated with military and historical associations. So we find the kings in the first French cards, David, Alexander, Cæsar, and Charlemagne, representing the monarchies of the Jews, Greeks, Romans, and French; the queens, representing Argine, Esther, Judith, and Pallas. The knaves, the ace, and the number of the cards were based upon similar ideas; but many changes and modifications have taken place at various periods, according to the customs and tastes of different countries. About the year 1660 heraldic cards were introduced into England, on which the kings of clubs, spades, diamonds, and hearts were respectively represented by the arms of the pope and of the kings of France, Spain, and England. A modern pack consists of 52 cards, comprising four suits: two red, hearts and diamonds; and two black, spades and clubs. Each suit consists of three court or picture cards, the king, queen, and knave, and ten other cards distinguished by the number of spots, ranging from one to ten. The one spot is known as the ace, and the two and three are often called respectively the "deuce" and "tray."—Breitkopf's *Versuch des Ursprungs der Spielkarten* is one of the most learned dissertations on the subject. Singer's "Researches into the History of Playing Cards" was published in London in 1816; Leber's *Études historiques sur les cartes à jouer*, in Paris in 1842; and Chatto's "Facts and Speculations on the Origin and History of Playing Cards," in London in 1848.

CARDUCHI, an ancient warlike tribe, who inhabited the mountainous regions between Mesopotamia and modern Persia, now named Kurdistan, and are supposed to have been the ancestors of the present Kurds. They were famous for their skill in archery, and baffled all the attempts of Persian monarchs to subdue them. The retreat of the 10,000 Greeks, after the battle of Cunaxa, lay through the country of the Carduchi, and was harassed by constant attacks from the natives. Xenophon gives an account of their habits and modes of life.

CARDWELL, I. Edward, an English clergyman, born at Blackburn, Lancashire, in 1787, died in Oxford, May 23, 1861. He studied at Oxford, in 1809 became fellow of his college, tutor, and lecturer, and in 1814 was appointed one of the university examiners. In 1826 he was elected Camden professor of history, and in 1831 principal of St. Alban's hall, succeeding Archbishop Whately. He also held a college living, was for many years a member of the governing council of the university, and was the private secretary of three successive chancellors. He wrote several works bearing upon English ecclesiastical history and "Lectures on the Coinage of the Greeks and Romans," and edited Aristotle's "Ethica," Josephus's "History of the War of the Jews," and a *variorum* edition of the Greek Testament, with a marginal harmony and notes. **II. Edward**, an English statesman, nephew of the preceding, born in Liverpool in 1813. His father was a wealthy merchant. He took a double first-class degree at Oxford in 1835, and was called to the bar in 1838. He was elected to parliament for Clitheroe in 1842, and as a supporter and friend of Sir Robert Peel, one of whose literary executors he became, he was returned for Liverpool in 1847; but he failed to be returned for that city and also for Ayrshire in 1852, and has represented the city of Oxford almost uninterruptedly since January, 1853, as a liberal conservative. He was secretary of the treasury from February, 1845, to July, 1846; president of the board of trade from December, 1852, to February, 1855; chief secretary for Ireland from June, 1859, to July, 1861; from the latter period till April, 1864, chancellor of the duchy of Lancaster; and afterward secretary for the colonies till July, 1866. In December, 1868, he was appointed a member of the council of education and secretary of state for war, which office he continues to hold (1878).

CARÊME, Marie Antoinette, a French cook, born in Paris, June 8, 1784, died Jan. 12, 1833. In 1804 he had reached such a degree of proficiency as a cook that he entered Prince Talleyrand's kitchen, where he gained an unparalleled reputation. He was afterward employed by the prince regent of England (George IV.), and by the emperors of Russia and Austria. He also evinced his talents at the congresses of Aix-la-Chapelle, Laybach, and Verona, remained some time at the court of Würtemberg, and finally returned to France, where his services were secured by Baron James Rothschild. Carême was an artist in his line, always eager for progress and improvement; he peculiarly excelled in pastry, and the general arrangement of serving the table. He published *Le pâtissier pittoresque*, illustrated by 128 plates; *Le cuisinier parisien*; *Le pâtissier royal parisien*; and *Le maître d'hôtel français*, a comparison between ancient and modern cooking.

CAREW, Thomas, an English poet, born in Gloucestershire about 1589, died in 1639. He studied at Oxford, and afterward became gen-

tleman of the privy chamber to Charles I. He enjoyed the friendship of Ben Jonson and other poets of the day, and at court he was much esteemed for the vivacity of his wit and the elegance of his manners. He wrote sonnets and amorous poetry, and a masque set to music by Henry Lawes, called *Calum Britannicum*. It was performed by the king and nobles, at Whitehall, on Shrove Tuesday, 1633. Two of the best pieces in his collected works also appear among the works of Herrick.

CAREY, I. Henry, an English poet and musician, a natural son of George Savile, marquis of Halifax, born near the end of the 17th century, committed suicide, Oct. 4, 1743. "God save the King" has been attributed to him, and the ballad of "Sally in our Alley" is his. In 1729 he published a volume of poems, and in 1732 six cantatas written and set to music by himself. He wrote several operatic farces, two of which, "Chrononhotonthologos" (1734) and "The Dragon of Wantley" (1737), met with great success. His songs were published in 1740, and his dramatic works in 1743. **II. George Savile**, an English dramatic poet, son of the preceding, died in 1807. He was first a printer, but became an actor, and spent 40 years in composing and singing popular and patriotic songs. He was also the author of several farces.

CAREY, Henry Charles, an American political economist, son of Matthew Carey, born in Philadelphia, Dec. 15, 1793. He was educated as a bookseller, entering his father's store at the age of 8, and remained there, mingling his elementary studies in literature with business, till 1814, when he became a partner in the firm. This association continued till his father retired in 1821. He then became the leading partner in the firm of Carey and Lea, and subsequently in that of Carey, Lea, and Carey, in their time the largest publishing house in the country. In 1824 he established the system of trade sales, as a medium of exchange between booksellers. In 1835, after a successful career, he withdrew from business, to devote himself to the study of political economy. Originally a zealous advocate of free trade, he became convinced that real free trade with foreign countries was impossible in the existing state of American industry, and that a period of protection must first be gone through with. In this view, free trade is the ideal toward which we ought to tend, and protection the indispensable means of arriving at it. He is recognized as the founder of a new school of political economy, opposed to the rent doctrine of Ricardo and the Malthusian theory of population. The leading principles of his system are, briefly, that in the weakness of savage isolation man is subject to nature, and that his moral and social progress are dependent on his subjecting nature to himself; that the land, worthless in itself, gains all its value from human labor; that the primitive man, without tools and without science, of necessity begins

his cultivation upon the light, salubrious, and easy soils of sandy elevations, and gradually advances to the subjugation of more fertile and difficult regions; that the real interests of classes and individuals are essentially harmonious; that there is in the normal condition of things a constant tendency to increase in the wages of labor, and to diminution in the rate, though to increase in the aggregate, of the profits of capital; and that the well being and advancement of society correspond to the degrees of association and of liberty which exist in it. His first book was an "Essay on the Rate of Wages, with an Examination of the Causes of the Difference of the Condition of the Laboring Population throughout the World" (1835). This work was reproduced and expanded in "The Principles of Political Economy" (3 vols. 8vo, 1837-'40). His succeeding works are: "The Credit System in France, Great Britain, and the United States" (1838); "Answers to the Questions, What constitutes Currency? What are the Causes of its Unsteadiness? and What is the Remedy?" a pamphlet (1840); "The Past, the Present, and the Future" (8vo, 1848); "The Harmony of Interests" (1850); "The Slave Trade, Domestic and Foreign: Why it Exists, and How it may be Extinguished;" "Letters on International Copyright" (1853; new ed., 1868); "Letters to the President on the Foreign and Domestic Policy of the Union, and its Effects, as exhibited in the Condition of the People and the States" (1858); "Principles of Social Science" (3 vols., 1858-'9); "A Series of Letters on Political Economy" (1860), and another series in 1865; "The Way to Outdo England without Fighting her" (1865); "Review of the Decade 1857-'67" (1867); "Review of Wells's Report" (1868); "Shall we have Peace?" (1869). For several years he also contributed the leading papers in "The Plough, the Loom, and the Anvil," a monthly periodical published in New York, some of which were afterward collected in his "Harmony of Interests." He has also written much in some of the principal newspapers of the country, on subjects connected with his special study. His "Miscellaneous Works" were published in one volume in 1869. His latest work is "The Unity of Law" (1873). The principal of these works have been translated into German, French, Italian, Russian, and Spanish (the "Principles of Social Science" into German by Adler, Berlin, 1863-'4; others by Dühring, 1865).

CAREY, Matthew, an American publisher and author, born in Dublin, Ireland, Jan. 28, 1760, died in Philadelphia, Sept. 16, 1839. At the age of 15 years he began to learn the business of printer and bookseller, and two years later published a pamphlet on duelling, followed soon after by an address to the Irish Catholics on their oppression by the penal code, which was so inflammatory that it caused his flight to Paris. After remaining there a year he returned to Ireland, where he edited for a short

time the "Freeman's Journal," and in 1788 established the "Volunteer's Journal," which soon obtained a very extensive circulation by its bold and uncompromising advocacy of measures of the opposition, which led soon after to the recognition by Great Britain of the legislative independence of Ireland. On account of an attack upon parliament and the ministry he was in 1784 arraigned before the house of commons for libel, and committed to Newgate, where he was imprisoned until the dissolution of parliament. After his liberation he sailed for America, arriving at Philadelphia Nov. 15, 1784, and two months after started "The Pennsylvania Herald," the first newspaper in America which furnished accurate reports of legislative debates, Carey acting as his own reporter. He fought a duel with Col. Oswald, the editor of a rival journal, and received a wound which confined him to his house for more than 16 months. Soon after he began the publication of "The American Museum," which he conducted for six years with much ability but little success. In 1791 he married, and began business as a bookseller on a very humble scale. During the prevalence of the yellow fever, two years later, he was a member of the committee of health, and active in his study of the disease and attentions to the sick; and the results of his extensive observation were collected and published in his "History of the Yellow Fever of 1793." In the same year he founded the Hibernian society. In 1796 he was one of a few citizens who united under the direction of Bishop White in the formation of the first American Sunday school society. In 1810 he engaged warmly in the discussions concerning the United States bank, writing articles for newspapers, and publishing pamphlets which he distributed at his own expense. In 1814 appeared his "Olive Branch, or Faults on both sides, Federal and Democratic," designed to harmonize the antagonistic parties of the country, pending the war with Great Britain. It passed through 10 editions, and is yet regarded as high authority in regard to the political history of that period. In 1819 he published his *Vindicia Hibernica*, an examination and refutation of the charges against his countrymen in reference to the butcheries alleged to have been committed by them in the rebellion of 1641. From this time he devoted himself almost exclusively to politico-commercial pursuits, publishing in 1820 the "New Olive Branch," in which he endeavored to show how harmonious were the real interests of the various portions of society; and in 1822, "Essays on Political Economy." This was followed by a series of tracts, extending to more than 2,000 pages. The object of all these publications was to demonstrate the necessity of the protective system, as the only means of promoting the real interests of all classes of the community. He was active in the promotion of all the public works of his city and state, and advocated the system of in-

ternal improvements which led to the construction of the Pennsylvania canals; and he was active in promoting education, and in forming associations for the relief of those unable to help themselves. In 1833-'4 he contributed his autobiography to the "New England Magazine."

CAREY, William, an English missionary and oriental scholar, born in Paulerspury, Northamptonshire, Aug. 17, 1761, died at Serampore, India, in June, 1834. He was the founder, in connection with other ministers, of the first Baptist missionary society. In 1798 he devoted himself personally to the missionary work, and embarked with his family for India. After five years spent in preaching and studying the Bengalee and Sanskrit languages, he fixed the scene of his labors at Mudnabaty, but was not permitted by the Indian government to make a permanent establishment there. He next removed to the Danish settlement of Serampore, where he established that large and successful missionary post of his denomination which has been the theatre not only of his own labors and death, but of the toils of Ward and of Marshman, the English translator of Confucius. Carey became an unremitting student of the oriental languages, and lived to see 40 different oriental dialects become the channels of transmission for Christianity to as many tribes. In addition to these labors, he taught in the college of Fort William the Bengalee, Sanskrit, and Mahratta languages, and furnished to the Asiatic society, of which he was a member, many valuable papers on the natural history and botany of India. He published several works on the oriental languages, the most important being a Bengalee and English dictionary (8 vols., 1815-'25).

CARGILL, Donald, a Scotch Presbyterian and Covenanter, and a leader of the Cameronians in and after the Sanguhar declaration, born in the parish of Rattray, Perthshire, about 1610, executed in Edinburgh, July 27, 1681. He was educated at Aberdeen, and became minister of Barony parish of Glasgow some time after the division among the clergy in 1650. In 1661, refusing to accept collation from the archbishop and to celebrate the king's birthday, he was banished beyond the Tay, but paid no attention to the act. In 1668 he was called before the council, and peremptorily commanded to depart. When indulgence was proclaimed to the Presbyterian ministers, he refused to accept it, and made a stand with others at Bothwell Bridge against the royal forces. He was severely wounded, and compelled to flee to Holland, but was again in Scotland in 1680, and, with a like-minded enthusiast named Hall, lurked around Queen's Ferry for several months, eluding the vigilance of the authorities, till June 8, when both were arrested, and Hall was killed in the affray. On the person of Hall was found the violent paper known in the ecclesiastical history of Scotland as the "Queen's Ferry Covenant." On June 22, with Cameron and others, Cargill made the famous

Sanguhar declaration. In September following, after he had preached to a congregation in the Torwood, between Falkirk and Stirling, he pronounced excommunication against the king and other state dignitaries, because they had usurped the supremacy of the pure church of Scotland. He was now excommunicated, and a reward set on his head. In May, 1681, he was apprehended at Covington, Lanarkshire, and taken to Edinburgh, where he was hanged and beheaded for high treason.

CARNEIL, Étienne de, a Jesuit missionary among the Huron and Iroquois Indians in Canada. He first visited these tribes in 1668, obtained a complete mastery of their languages, and was regarded by the savages both as a saint and a man of genius. The date of his death is unknown, but he was still laboring with undiminished activity, though with little success, in 1721, when Charlevoix left Canada.

CARIA, an ancient country situated in the S. W. extremity of Asia Minor, separated from Phrygia and Lydia by the Cadmus and Messogis mountains. It was intersected by low mountain chains, running far out into the sea, and forming several spacious bays. Among the headlands were Mycale or Trogilium, opposite Samos; Posidium, on which stood Miletus; the long tongue of land on the south side of which was Halicarnassus; and the longer one at the outer extremity of which was Cnidus. The chief river was the Mæander. The valleys between the mountain chains were fertile, producing corn, grapes, oil, and figs. The Carians, according to Herodotus, were not the aboriginal inhabitants of the region, but a branch of the Pelasgic race, originally seated in the islands of the Ægean. When Minos had formed a navy and subdued the Ægean isles, he transplanted them to Asia Minor. In after times Greek colonies repelled the Carians from their coasts, and built cities on their promontories, the northern of which were then reckoned parts of Ionia, and the southern formed the territory called Doris; while the Lydian kings, Alyattes and Cræsus, subdued the inland country. On the overthrow of the Lydian monarchy, Caria became subject to Persia, under a line of vassal kings and queens, including the two Artemisias, and ending with Ada, who had been deposed by the Persians, but was restored to the government by Alexander the Great. (See HALICARNASSUS.) Later the territory was successively annexed to the kingdoms of Egypt and of Syria. After the Romans had vanquished Antiochus, they gave Caria to the Rhodians and Attalus in reward of their fidelity and services as allies; and on the conclusion of the Mithridatic war they ultimately annexed it to their proconsular province of Asia. The considerable cities of the country, Halicarnassus, Mylassa, Cnidus, and Miletus, were the work of Greeks, not of Carians. The Carians had the same religion as the Lydians and Mysians. Their language was accounted barbarous by the Greeks.

CARIBBEAN SEA, that portion of the Atlantic lying between Cuba, Santo Domingo, and Porto Rico on the north, Venezuela and Colombia on the south, the Lesser Antilles on the east, and Central America and Yucatan on the west, and communicating with the gulf of Mexico through a channel about 120 m. wide, extending from the W. point of Cuba to the E. point of Yucatan. Its shores are high and rocky, and contain some gulfs of considerable extent. Its navigation for the most part is clear and open.

CARIBBEE ISLANDS. See ANTILLES, and WEST INDIES.

CARIBOU (*rangifer caribou*), the American reindeer. Richardson observes that there are two well marked permanent varieties of caribou that inhabit the fur countries: one of them, the woodland caribou above indicated, confined to the woody and more southern district, and the other, the barren ground caribou (*R. Grælandicus*), retiring to the woods only in the winter, but passing the summer on the



Caribou.

coast of the Arctic ocean, or on the barren grounds so often mentioned in his work. There is a large variety in Newfoundland, Nova Scotia, and New Brunswick, having extraordinarily large and heavy horns. It is said by Dr. Gray that the horns of the Newfoundland variety, some of which are preserved in the British museum, greatly resemble those of the Siberian animal; but Pallas remarks that the American species differ from the former in the structure of the hoof, and are absolutely American animals. The color of the caribou of North America is in the summer a rich, glossy, reddish brown, becoming more grizzly, especially about the head, neck, and belly, toward the winter; but it never becomes anything approaching to white. The antlers of the woodland caribou, on rising from the head, curve backward and then forward in a segment of perhaps the sixth of a circle for about half their length, or somewhat less; then curve backward again, and again forward, making in the upper sweep

nearly a semicircle. They have no backward branch or spur whatever, except one short point close to the tip. The main branch of the antlers is cylindrical, much smoother than those of the red deer or wapiti, and at the upper extremity has two, three, or four, but seldom more than two, sharp cylindrical spikes. That, however, which constitutes the main difference between the antlers of this animal and of the tame reindeer, or indeed of any other of the deer tribe, is this: that while on the upper extremities of the horns are rounded spikes, the lower branches are broad palmated surfaces. The lower of these, or brow antler, which is the principal defensive weapon of the animal, curves downward over the eyes, and is several inches in breadth, with many sharp spurs or points round the lower border. The second, or superior process, which shoots horizontally forward from the point where the two curvatures of the main antler meet, is longer than the lower or brow antler, and looks as if it were more so than it really is, from the direct line in which it projects, instead of being deflected downward. The forward points of the brow antler, the sur-antler, and the upper tips or extremities of the whole, are as nearly as possible in a right line. The measurement of a medium-sized set of antlers, from Newfoundland, is as follows: extreme width from tip to tip, 1 ft. 4½ in.; length of the exterior curvature, from root to tip, 2 ft. 8½ in.; direct height, 23 in.; girth at the root of the antler, 5½ in.; at the insertion of the upper prong, 4 in.; length of palmated brow antler, 11 in.; breadth 8 in., processes 7 in number; length of the sur-antler 12 in., breadth 8 in., processes 3, very strong and sharp. The prongs of the upper extremity are irregular, one antler having three, the other two points. The caribou has a short tail, like that of a hare or rabbit, and entirely different from the long tail of the red deer or wapiti. The hoofs have an immense spread, owing to the extension of the cleft of the hoof through the cornea, and far up the pastern of the animal, which gives it, when running over soft snow, or, what is worse, over a crusted surface, a support almost equal to that of a snow shoe. The average weight of the woodland caribou is from 250 to 300 lbs., that of the barren ground caribou from 90 to 130 lbs.; those of Spitzbergen and Melville island do not exceed 125 lbs. The length of the *R. caribou* is 6 ft., with a tail of 6 in.; height at shoulder, 3½ ft.—To the natives of North America the reindeer is known only as an animal of chase, but it is a most important one; there is hardly a part of the animal which is not made available to some useful purpose. Clothing made of the skin is, according to Dr. Richardson, so impervious to the cold that, with the addition of a blanket of the same material, any one so clothed may bivouac on the snow with safety, in the most intense cold of an arctic winter night. The venison, when in high condition, has several inches of fat on

the haunches, and is said to equal the venison of the best fallow deer of the English parks. The geographical range of the caribou is over all the northern parts of America, and abundantly over all the habitable parts of the arctic regions, and neighboring countries, extending to a much lower latitude than the range of the reindeer in the eastern continent, and passing still further south on all the principal mountain chains. The southern limit of the caribou appears to be about the parallel of Quebec, across the whole continent; but the animal is most abundant between lat. 63° and 66° N. It was occasionally found until within a few years in the Adirondack mountains. (See REINDEER.)

CARIBS, an Indian nation which when Columbus reached the new world occupied Porto Rico, the Lesser Antilles, and a portion of the mainland of South America, in what is now Guiana and Venezuela. The name signified brave, and they were very fierce and cruel. They had canoes capable of carrying 50 men, and made constant war on the milder Yucayos occupying the larger islands. They were man-eaters, the term cannibals being originally one of the names of the nation. They were gradually reduced or expelled from the islands to the mainland. At present only a few remain on Trinidad, Dominica, and St. Vincent. They are divided into the Caribs proper; Galibi, in French Guiana; Tuapoka, on the lower Orinoco; Yaoui, in Trinidad and Venezuela; Guachire, on St. Margarita; and include apparently the Avarigotes, Purugotes, and Acherigotes. They resembled some of our northwestern tribes in their use of paint, weeping on occasions of joy, and in fasting and severe probation for the chieftainship. The French began missions among them at an early day, and a catechism and dictionary of the Galibi were printed in 1663-'5 by Raymond Breton.

CARICA, a genus of plants belonging to the natural order of *papayaceae*, containing about

10 species, natives of tropical America. They form small trees, generally without branches, with large, variously lobed leaves, resembling those of some kinds of palms. The male and female flowers are usually on different trees. The fruit is fleshy. The most remarkable species is the *C. papaya*, or papaw tree. (See PAPAW.) The *C. digitata* or *spinosa*, found in Brazil and Guiana, where it is called the chambura, is about 20 ft. high, with spiny stem and branches. Its juice is very acrid, causing blisters and itching when applied to the skin. The fruit is insipid and eaten only by ants; and the flowers emit a stercoraceous odor.

CARIES (Lat. *caries*, decay), a chronic inflammation of bone, accompanied generally by the formation of matter, which tends to make its way externally. The so-called spongy tissue, of which are composed the bones of the wrist and ankle and of the spine, and the ends of the long bones of the limbs, is that usually affected. It is to be distinguished from necrosis. In the latter disease a part of the bone has its blood supply cut off, dies, and acts as a foreign body, until thrown off by nature or removed by the surgeon. In caries the disease is, so to speak, centrifugal, the bone being gradually absorbed by the growth of a soft newly formed tissue, composed chiefly of microscopic cells, which is formed in the spaces of the spongy tissue normally filled by marrow. In necrosis therefore the cause, being generally local, soon ceases to act, and the bone or piece of bone which has died, if not extruded by nature or removed by the surgeon, will act, as would a splinter, as a foreign body and to be expelled. In caries, the disease, being constitutional, tends to spread and finally to implicate the whole bone or district of bone, and very frequently those which are contiguous. Necrosis may be compared to a slough of the soft parts, caries to an ulcer of the same. Scrofula and syphilis are the most frequent causes of caries. It may be excited by a local injury, but in such a case it is an expression of some constitutional disturbance or condition; the same injury in a healthy person not being followed by a like result. The symptoms are those of a chronic inflammation: pain and tenderness, followed sooner or later by swelling, redness, and heat of the superficial parts; the formation of matter, which tends to make its way by one or more (often sinuous) tracks to the nearest surface, and continues to be discharged so long as the disease lasts. A probe passed to the bottom of such a track would come in contact with roughened bone, or more often would impinge upon the new tissue spoken of above, through which it would have to be thrust in order to touch the bony wall of the cavity in which the disease existed. In caries of the spine the matter would make its way downward and present itself as an abscess in the groin. If near a joint, as for instance in caries of the upper end of the leg bone, this may by implication become disorganized. The patient's general health would probably indi-



Carica spinosa.

cate a constitutional disturbance other and greater than could be accounted for by the local trouble. The prognosis would depend on the cause and situation of the disease, and the age, constitution, and civil condition of the patient. Though nature might in many cases effect a cure, the process would usually be tedious, and assistance on the part of the surgeon be necessary. Good food and air, proper exercise, and perhaps cod-liver oil, iron, and quinine, form the appropriate general treatment. Locally, mechanical support to counteract deformity and prevent the pressure of one ulcerated surface upon another, the judicious opening of abscesses, injections along the abscess tracks to induce a more healthy action, and finally, where practicable, the removal of the diseased parts, are indicated.

CARIGNANO, or **Carignan**, a town of Italy, on the Po, in the province and 10 m. S. of Turin; pop. about 8,000. It is noted for its manufactures of silk twist and confectionery. It has several fine churches. Carignano was acquired by the house of Savoy early in the 15th century, and Duke Charles Emanuel I. gave it in 1630 as an apanage to his youngest son, Tommaso. This prince became the founder of the younger line of Savoy, which in 1831 ascended the throne of Sardinia with Charles Albert, and is now the royal house of Italy. A branch of this family received in 1834 the title of princes of Savoy-Carignan.

CARINI, a town of Sicily, in the province and 10 m. W. N. W. of Palermo; pop. about 10,000. It is beautifully situated on a small river of the same name, standing on a steep eminence about 8 m. from the sea, and has a fine old Gothic castle. Near it are vestiges of the ancient Hyccara, the birthplace of Lais.

CARINTHIA (Ger. *Kärnten*), a duchy in the Cisleithan half of the Austro-Hungarian monarchy, bounded N. by Salzburg and Styria, E. by Styria, S. by Carniola and Italy, and W. by Tyrol; area, 4,006 sq. m.; pop. in 1871, 337,694, of whom 69 per cent. were Germans and 31 per cent. Slovans, the latter living mostly S. of the Drave. It is a mountainous tract of country, the highest point being the Grossglockner, 12,776 ft. The Drave is its principal river, and the lake of Klagenfurt or Wörth-See the only considerable lake. There are some manufactures, and a considerable trade in grain and cattle, but the principal wealth of the country is mineral. It produces annually about 1,340,000 cwt. of raw and cast iron, 72,000 of lead, and 20,000 of zinc. The total value of the mineral products is 6,800,000 fl. The industry is almost confined to the manufacture of metals, especially iron ware. The diet consists of the Landeshauptmann, the bishop of Gurk, and 27 delegates. Capital, Klagenfurt.

CARINUS, **Marcus Aurelius**, the elder of the two sons of the Roman emperor Carus, who conjointly succeeded to the throne in 283. The younger, Numerian, was supposed to have been murdered on his return from the East, and

Carinus, ruling alone, became one of the most profligate and cruel of the Roman emperors. The soldiers having rebelled and proclaimed Diocletian, Carinus marched into Moesia to quell the revolt. In 285 a decisive battle was fought near Margum, in which Carinus gained the victory; but in the moment of triumph he was slain by one of his own officers, whose wife he had seduced.

CARIPE, a town and valley of Venezuela, 40 m. S. E. of Cumaná. The valley is noted for a cavern frequented by a species of night hawk (*caprimulgus*), the young of which are annually destroyed in great numbers for the sake of their fat, of which excellent oil is made. The cave is of limestone formation, 2,800 ft. deep, and for some distance 60 to 70 ft. high. Humboldt visited and described this cavern. The town is the principal station of the Chayma Indian missions.

CARISBROOKE, an agricultural village, once a thriving market town, of the isle of Wight, England, situated at the foot of a hill, near the centre of the island, in a parish of its own name, 1 m. S. of Newport; pop. of the parish about 8,000. Under the independent lords of Wight it was the capital of the island, and afterward became the residence of the governor, who occupies a handsome mansion within the precincts of a ruined castle of great antiquity, crowning the hill back of the village. This castle is supposed to have been founded before



Carisbrooke Castle.

the Roman invasion; was taken by Cerdic, the Saxon, in 530; enlarged by William Fitzosborne, a relative of William the Conqueror, and first lord of Wight, in the 11th century; and after many additions completed in the time of Elizabeth, when it covered an area of 20 acres. It has a well 200 ft. deep. It was the place of confinement of Charles I. after his removal from Hampton Court, and a window is pointed out by which the royal captive made a fruitless attempt to escape. After his execution it became the prison of his two youngest children, the duke of Gloucester and the princess Elizabeth, the latter of whom died here. A ruined Cistercian priory, founded by Fitzosborne, occupies an eminence opposite the castle. The priory church is now parochial, and the other

remaining portions are occupied as sheds and stables. The village has an infant school and several chapels for dissenters. The parish contains infantry barracks, a house of industry, a juvenile reformatory, and some corn mills on the Medina river.

CARISSIMI, Giovanni Giacomo, an Italian composer, born in Venice near the close of the 16th century, died about 1674. He was for a number of years director of the pontifical chapel at Rome, and at his death left a large number of compositions, consisting mostly of oratorios, masses, and cantatas. The publication of his oratorios was commenced in 1872. We are indebted to him for orchestral accompaniments to sacred music, and for great improvements in the recitative. He was also one of the first to write cantatas. His melodies are distinguished by grace and spirit, and his harmony is effective. His style, perfected by his pupils Bononcini, Bassani, and Scarlatti, is considered the foundation of the music of the 18th century.

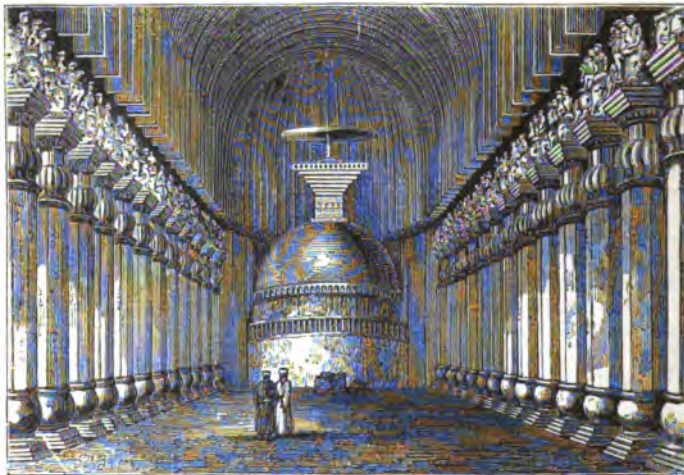
CARLEE, or Karl, a village of Hindostan, in the collectorate of Poonah, presidency of Bombay, 40 m. E. of Bombay. It is remarkable

it are several smaller excavations, apparently intended as cells for hermits. These are dilapidated, but the temple is well preserved. The only object of devotion to be seen is the mystical chhattah or umbrella.

CARLÉN, Emilia Schmidt Flygare, a Swedish novelist, born at Strömstad, Aug. 8, 1807. In 1827 she was married to a physician named Flygare, was left a widow in 1833, and in 1841 became the wife of J. G. Carlén, a lawyer of Stockholm, also known as a poet and novelist. Her first novel, "Waldemar Klein," was published anonymously in 1838. She has since written more than 30 works, the greater part of which have been translated into English, French, and German. The following are some of the best known: "The Birthright," "Gustavus Lindorm," "The Hermit," "Twelve Months of Matrimony," "The Rose of Thistle Island," "The Lover's Stratagem," "Home in the Valley," "The Maiden's Tower," "Marie Louise," "Woman's Life," "The Temptations of Wealth," "A Brilliant Marriage," and "The Professor." Her subjects are usually chosen from the lower ranks of Swedish society, and she is distinguished more for accurate

delineation of real life than for imaginative power.

CARLETON, I. An eastern county of Ontario, Canada, bounded N. by the Ottawa river and intersected by the Rideau river; area 647 sq. m.; pop. in 1871, 21,739, of whom 16,774 were of Irish origin or descent. It is traversed by a railroad connecting Ottawa with Prescott on the St. Lawrence, and by the Rideau canal from N. to S. The county contains valuable timber and much grand scenery. At Ottawa, in the Ottawa river, are the Chaudière falls (see



Cave Temple at Carlee.

for a Buddhist cave temple, hewn from the face of a precipice, about two thirds of the way up a steep hill which rises 800 ft. above the plain. A noble arch spans the entrance to the excavation, and on each side of the door is a screen work, covered with naked male and female figures carved in alto-rilievo. In front are three lions placed back to back, on the top of a pillar; around the portico are several well executed figures of elephants of great size, each surmounted by a mohout and a howdah containing two persons. The length of the temple is 130 ft., width 40 ft. The interior has a double row of sculptured pillars, terminating in a semicircle, and with its high arched roof is not unlike that of a Gothic cathedral. Near

OTTAWA), below which the river is spanned by a suspension bridge connecting the provinces of Ontario and Quebec. There are also two falls in the Rideau river at Ottawa. Lumber forms the chief industry. Capital, Ottawa. **II.** A western county of New Brunswick, Canada, bounded W. by the state of Maine, and watered by the river St. John and its numerous tributaries; area, 3,008 sq. m.; pop. in 1871, 19,938. The surface presents many irregularities, the elevations sometimes rising into mountains. On the secondary banks of the rivers there are broad stretches called intervalles. The forests are exceedingly fine, and have been largely drawn upon for timber for ship building and export. Capital, Woodstock.

CARLETON, Sir Guy, Lord Dorchester, a British general, born at Strabane, Ireland, Sept. 8, 1724, died at Maidenhead, Nov. 10, 1808. He distinguished himself at the sieges of Louisburg, Quebec, and Belle Isle, and was wounded in 1762 at the siege of Havana. In 1772 he was made governor of Quebec. On the nomination of Burgoyne to the command, he threw up his commission, but was appointed the same year lieutenant general. He succeeded Sir Henry Clinton as commander-in-chief in the American colonies in 1781, and was in command at the close of the revolutionary war.

CARLETON, William, an Irish novelist, born at Clogher in 1798, died in Dublin, Jan. 30, 1869. A peasant's son, he had obtained only an elementary education, when at the age of 17 he entered a boarding school at Glasslough, where he remained two years. He went to Dublin with only a few shillings in his pocket, and after struggling a number of years was brought into notice by his "Traits and Stories of the Irish Peasantry" (4 vols., 1830-'32). His "Fardorougha the Miser" appeared in 1839, and in 1841 he published three volumes of tales, mostly pathetic, but including the humorous sketch of "The Misfortunes of Barney Brangan." His other novels, several of which are of a political character and anti-English in tone, are: "Valentine McClutchy" (1845); "Rody the Rover" (1846); "The Black Prophet, a Tale of the Irish Famine" (1847); "The Tithe Proctor" (1849); "Willy Reilly" (1855); and "The Evil Eye" (1860). He received from the government a pension of £200.

CARLI, or **Carli-Rabbi**, Giovanni Rinaldo, count, an Italian economist and antiquary, born at Capo d'Istria, April 11, 1720, died in Milan, Feb. 22, 1795. In 1744 he was appointed by the senate of Venice professor of astronomy and navigation in the university. While here he became involved in an acrimonious controversy with the abbé Tartarotti on the existence of witches and magicians, which excited great attention throughout Italy, more than 20 writers taking part in it, most of them on the side of Tartarotti, and only four supporting Carli, who maintained the skeptical side, and denied that witches and witchcraft, magic and magicians, had ever any other than an imaginary existence. After seven years he resigned his professorship, and in 1765 Leopold of Tuscany placed him at the head of the board of public economy and public instruction. Some years before his death he was relieved from the active duties of these offices, although he retained the emoluments belonging to them. He wrote *Della spedizione degli Argonauti in Colco* (Venice, 1745); *Delle monete e dell'istituzione delle zecche d'Italia* (3 vols., Milan, 1750-'60); *Lettere Americane* (3 vols., Florence, 1780-'81); *Delle antichità italiane* (5 vols., Milan, 1788-'91); and *Storia di Verona, sino al 1517* (7 vols., 1796). The collective edition of his works (18 vols., Milan, 1784-'94) does not contain the "American Letters."

CARLI, Dionigi, an Italian missionary, born in Reggio, died after 1680. He was sent in 1666 to Congo by the propaganda, with Michel Angelo Guattini and 14 other Capuchin friars. After resisting for some time the severity of the climate, he was obliged to return to Europe. He wrote an account of his travels, which was translated into French, English, and German. The English translation was published in Churchill's and Pinkerton's collections.

CARLINO (Carlo Antonio Bertinazzi), an Italian pantomimist, born in Turin in 1713, died in Paris, Sept. 7, 1783. He entered the Sardinian army at an early age, but at the death of his father, who was an officer, he quitted the service, and taught fencing and dancing. His favorite occupation, however, was playing comedy with his pupils, and his success in it suggested the idea of making it a profession. The harlequin of the Bologna theatre having run away from his creditors, Bertinazzi took his place, and the public did not suspect the substitution until the fourth performance. In 1741 he was invited to Paris, where he performed with success. He had a remarkable faculty of dramatic improvisation.

CARLISLE, a borough and the capital of Cumberland co., Penn., on the Cumberland Valley and the South Mountain Iron company's railroads, 18 m. W. by S. of Harrisburg; pop. in 1870, 6,650. It is situated in the great limestone valley enclosed between the Kittatinny and South mountains. The surrounding country is level, productive, and highly cultivated. The town is well built, with wide and spacious streets, a public square, on which stand the county buildings, and public edifices of a superior order. Dickinson college, founded here in 1783, and now under the care of the Methodists, is one of the oldest and most flourishing institutions in the state. The town has 13 churches, 2 banks, 2 weekly newspapers, 2 machine shops, a car factory, and barracks for 2,000 men, built in 1777. Four miles north, in a valley of the Blue mountains, are Carlisle sulphur springs. During the whiskey insurrection, in 1794, Gen. Washington had his headquarters at Carlisle. It was shelled by the confederates on the night of July 1, 1863.

CARLISLE (anc. *Luguvallio* or *Luguwallum*), a city of England, and the shire town of Cumberland county, 260 m. N. N. W. of London, and 50 m. W. S. W. of Newcastle; pop. in 1871, 31,074. It is situated on the river Eden, and is a handsome city. There are a custom house, a news room, a market, and a handsome railway station. A fine five-arch bridge has been built over the Eden. There are several institutions for benevolent purposes. The cathedral church is a structure of the middle ages, not remarkable for size or beauty. There are four other churches, several chapels, an endowed grammar school, British, national, and infant schools, two literary institutions, a mechanics' institute, a library, five banks, and

a savings bank. The castle was built by the Normans in 1092, and many parts of it are in excellent preservation. It is still used as a garrison fortress. The city is one of the oldest



Entrance to the Castle.

in England, and was a Roman station. Its proximity to the border made it important as a military station in the wars between the English and Scotch. In the civil war Carlisle sided with the king, and it declared for the pretender in 1745. The inhabitants are principally employed in manufactories of cotton goods and gingham, founderies, hat factories, and dye works. It is connected with the Solway frith by a canal which gives it a share of the coasting trade. It gives the title of earl to the Howard family, and is a bishop's see. The municipal government is administered by a mayor, 10 aldermen, and 30 councillors. It returns two members to parliament, and is the centre of a poor-law union.

CARLISLE, Sir Anthony, an English surgeon and physiologist, born near Durham in 1768, died in London, Nov. 2, 1840. He was surgeon of Westminster hospital for 47 years, and was knighted by George IV. He was the first to introduce the practice of holding public consultations in cases requiring operation; and also to substitute the straight-bladed amputating knife for the crooked one of former days. His chief work is his "Essay on the Disorders of Old Age."

CARLISLE, I. Frederick Howard, fifth earl of, an English statesman, born May 28, 1748, died at Castle Howard, Sept. 4, 1825. In the house of peers he first distinguished himself by his recommendation of conciliatory measures toward the American colonies. He was one of the three commissioners appointed in 1778 by George III. to visit America and endeavor to restore peace. From 1780 to 1782 he was viceroy of Ireland, and afterward became lord privy seal. In 1791-'2 he opposed the policy of Pitt in

resisting the aggressions of Catharine II. upon Turkey; in 1792 he abandoned his opposition to Pitt, and supported the war against the French republic. He was a warm advocate of the union with Ireland, and opposed the enactment of the corn laws in 1815. He was the kinsman and guardian of Byron, who dedicated to him his "Hours of Idleness," lampooned him in the "English Bards and Scotch Reviewers," and afterward made amends in the third canto of "Childe Harold." He published several pamphlets, and a volume entitled "The Tragedies and Poems of Frederick, Earl of Carlisle" (1807), several of which had been separately published and well received. **II. George William Frederick**, seventh earl of, an English statesman, grandson of the preceding, born in London, April 18, 1802, died at Castle Howard, Dec. 5, 1864. He succeeded to the earldom Oct. 7, 1848, previous to which time he was known as Lord Morpeth. He was for some time an attaché of the British embassy at St. Petersburg. From 1833 to 1841 he sat in the house of commons for Morpeth, and from 1846 to 1848 for the West Riding of Yorkshire. Under the Melbourne ministry, 1835-'41, he was chief secretary for Ireland. In 1844 he travelled in the United States. From 1846 to 1850 he was chief commissioner of woods and forests; from 1850 to 1852, chancellor of the duchy of Lancaster; from 1855 to 1858, and again from 1859 to 1864, lord lieutenant of Ireland. He was the first nobleman to accede to the views of the anti-corn-law league. In 1856 he delivered at Leeds two public lectures on the life and writings of Pope and on the United States. In 1854 he published his "Diary in Turkish and Greek Waters;" and in 1858 "The Second Vision of Daniel." In 1870 a statue of him was erected in Phoenix park, Dublin. He never married, and was succeeded in the earldom by his brother, Lord William Howard, born Feb. 23, 1808, who had taken holy orders, and was rector of Londesborough, Yorkshire.

CARLOS, Don. I. Crown prince of Spain, son of Philip II., born at Valladolid in 1545, died in prison at Madrid in July, 1568. He was sickly, and as he grew up was subject to violent bursts of passion, which his father hoped would be subdued by the discipline of the university at Alcalá. But as this proved of no avail, he was considered unfit for the throne, and in 1563 his cousins, the archdukes Rudolph and Ernest of Austria, were appointed in his stead presumptive heirs to the crown. When Alva was appointed in 1567 governor of Flanders, a post to which Don Carlos had aspired, the prince's exasperation led him to plan an assault upon his father, and to perpetrate one upon his uncle Don Juan, in consequence of which he was put under arrest, Jan. 18, 1568, and subsequently transferred to the prison where he died. His death as well as his life gave rise to many conflicting rumors. It has been commonly believed until recently that he was put to death by order of his

father; but recent historians have shown that he was insane, and died of a fever brought on by his own extravagance in diet and exposure. The incompatibility of temper between a rigid, iron-hearted man like King Philip, and a morbid, impulsive youth like Don Carlos, the fact that the prince had been engaged to Elizabeth of France, who subsequently became his stepmother, his sympathy with the revolt of the Netherlands, and his hatred of Alva and the other ministers of his father, all conspired to invest the melancholy fate of the prince with a halo of romance, which has been poetically treated by Alfieri, Campistron, Otway, and others, and above all by Schiller. **II. Carlos Maria Isidor**, pretender to the crown of Spain, son of King Charles IV., born March 29, 1788, died in Trieste, March 10, 1855. Many of the opponents of the constitutional régime which was restored in 1820 gathered around Don Carlos, hoping that, after the decease of his childless brother Ferdinand VII., he would ascend the throne. When absolutism was re-established in 1823, the most reactionary party leaders, and especially the representatives of the clerical interest, continued to cluster around him. But their hopes were frustrated by Ferdinand's marriage with Maria Christina, and by the abrogation of the Salic law, which placed Isabella upon the throne. In 1832, when Ferdinand was supposed to be on the eve of death, the Carlists succeeded in extorting from him a decree reestablishing the Salic law, and thus excluding Isabella; but he recovered his health, and the fraud practised upon him was immediately redressed. In 1833, when Ferdinand died, Don Carlos proclaimed himself king. Maria Christina, the regent, branded him as a rebel, and concluded with Britain, France, and Portugal the so-called quadruple alliance, the practical effect of which was to expel Don Carlos and Dom Miguel, the champions of absolutism, from Spain and Portugal. On July 1, 1834, Don Carlos left England, whither he had fled, smuggled himself into Spain, and succeeded in kindling a civil war in the northern provinces, which raged for upward of six years. Don Carlos eluded the vigilance of his opponents till 1839, when he was compelled to seek refuge in France, where, upon his refusal to renounce his claims, he was by order of the French government detained at Bourges. The decree which ordained his perpetual expulsion from Spain was unanimously confirmed by the cortes in 1836. In 1845 he adopted the name of count of Molina, abdicated in favor of his eldest son the count of Montemolin, and on receiving permission to leave France took up his abode in Austria. **III. Carlos Luis Maria Fernando**, son of the preceding, born Jan. 31, 1818, died at Trieste, Jan. 18, 1861. In 1846 he left Bourges, where he had resided with his father, and took up his abode in England under the name of the count of Montemolin. In April, 1849, he made an attempt to introduce

himself in disguise into Spain, but he was arrested, detained from April 5 to the 10th in the citadel of Perpignan, and on April 15 he was again in London. In 1860 he entered Spain with 8,000 men, was defeated at Tortosa, and made prisoner. He was soon set at liberty, upon renouncing his claim to the throne, but immediately retracted his renunciation.—His successor was his brother **DON CARLOS JUAN MARIA ISIDOR**, born May 15, 1822, who in October, 1868, resigned his claims to the crown in favor of his son, **CARLOS MARIA JUAN ISIDOR**, the present pretender (born March 30, 1848), in whose favor an active insurrection is now in progress (1878). **DON ALFONSO**, brother of the pretender (born Sept. 12, 1849), is among his most active supporters.

CARLOVINGIANS, or *Carolingians*, an imperial family who during the 8th, 9th, and 10th centuries gave sovereigns to Germany, France, and Italy. Their origin is traced back to Arnulf and Pepin of Landen, two powerful Frankish lords of Austrasia in the beginning of the 7th century, while they derived their name from Charles Martel, the conqueror of the Saracens at the battle of Poitiers in 732. This hero, the son of Pepin of Héristal, was the founder of the greatness of his house. Satisfied with the titles of duke of the Franks and mayor of the palace, under the weak Merovingian kings, he ruled with an absolute power the Frankish kingdoms of Austrasia, Neustria, and Burgundy. His son, Pepin the Short, confining within the walls of a convent the last of those kings, Childeric III., assumed the royal title; and his grandson Charles, afterward known as Charlemagne, having extended his conquests as far as the Ebro and Garigliano on the south, the Oder on the north, and the Carpathian mountains and the Theiss on the east, restored the western Roman empire, and consequently styled himself emperor. This Carolingian empire, consisting of a motley assemblage of nations brought together by conquest, and decidedly hostile to each other, could not long outlive its founder; it began to totter on his death, and then gradually fell into ruins. Its final disruption, which took place in the year 888, was followed by nine separate kingdoms, the most important of which, Germany, France, and Italy, continued for a while under the sway of the descendants of Charlemagne. The emperors of this family were Charlemagne, 800–814; Louis the Weak, or le Débonnaire, 814–840; Lothaire, 840–855; Louis II., son of Lothaire, 855–875; Charles the Bald of France, 875–877; Charles the Fat of Germany, 881–887. This was the last of the actual emperors of the Carolingian dynasty; but several princes, most of them in the feminine line, Guy of Spoleto, Lambert, Arnulf of Carinthia, Louis and Berenger of Italy, boasted the empty title. The Carolingian kings of Germany were Louis the German, 840–876; Louis the Younger or of Saxony, 876–882; Charles the Fat, 882–887; Arnulf of Carinthia, 887–899; Louis the Child, 899–911. To the

extinct house of Charlemagne those of Saxony and Franconia succeeded. The Carolingian kings of France are styled the second race of the Frankish kings, and succeeded the Merovingians. They were Pepin the Short, 752-768; Charlemagne, 768-814; Louis le Débonnaire, 814-840; Charles the Bald, 840-877; Louis the Stammerer, 877-879; Louis III. and Carloman, 879-884; Charles the Fat of Germany, 884-887; Charles III., the Simple, 893-923; Louis IV., d'Outre-mer (*Ultramarinus*), 936-954; Lothaire, 954-986; Louis V., the Idle, 986-987. On the death of this prince Hugh Capet was elected king by the nation, to the exclusion of the lawful heir, Charles, duke of Lorraine, the uncle of Louis V. Hugh was the head of the third dynasty, called after him Capetians. The Carolingians who acted as kings of Italy were Charlemagne, 774-781; Pepin, his son, 781-810; Bernard, 812-818; Louis le Débonnaire of France, 818-820; Lothaire, 820-855; Louis II., 855-875; Charles the Bald of France, 875-877; Charles the Fat of Germany, 880-888; Berenger (Guy of Spoleto, his rival), 888-894 and 905-924; Lambert, 894-898; Louis, 900-905; Hugh of Provence, 926-947; Lothaire, 945-950; Berenger II. and Adalbert, 950-961. On the death of Adalbert, the kingdom of Italy was united by Otto the Great to the German empire.

CARLOVITZ (Slavic, *Karlovic*; Hun. *Karlovice*), a town of Transleithan Austria, in the Slavonian division of the Military Frontier, on the Danube, 8 m. S. of Peterwardein; pop. in 1869, 4,419. It has a cathedral, three churches, an Oriental Greek gymnasium, and a Roman Catholic academy. There is a brisk transit trade and fisheries, and an extensive export trade in wormwood and wine, the quantity of the latter exported in some years amounting to 1,800,000 gallons. The neighboring vineyards yield excellent qualities of Hungarian wines. The Carlovitz red wines are especially renowned. The town is the seat of a Greek archbishop. A peace was concluded here in 1699, for the term of 25 years, between Austria, Poland, Russia, Venice, and Turkey, by the mediation of England and the Netherlands. By the terms of this treaty, Austria received Transylvania and most of the Turkish possessions in Hungary; Russia, Azov; Poland received back Podolia and the Ukraine, but ceded some Moldavian towns; Venice retained the Morea, and Turkey remained in possession of the banat of Temesvár. During the revolutionary era of 1848-'9, Carlovitz and its vicinity were the focus of the Serb rebellion against Hungary, and the theatre of collisions between the Serbs and the Magyars and the latter and the Austrians.

CARLOW (originally *Catherlogh*). I. A S. E. county of Ireland, in the province of Leinster, bounded by the counties Wicklow, Wexford, Kilkenny, and Queen's; area, 846 sq. m.; pop. in 1871, 51,472. It is level except on the south, where the Blackstairs and Mt. Leinster ranges give a rugged character to the district. The

counties are the Slaney and the Barrow. The county is of granite formation, covered in the plains by beds of gravel, and cropping out in the eminences of Mt. Leinster and the Blackstairs. It is well known for its agricultural character and produce. Out of the whole area of the county there are but 23,000 acres uncultivated, and cereals, roots, and green crops grow luxuriantly. It is one of the principal dairy counties of Ireland. The history of the county is, from its central position, closely connected with that of the English conquest and the Irish struggles to recover their independence. In 1798 Carlow was the seat of important movements. The antiquities are the cromlechs and the cathedral at Old Leighlin, a castle of the Butlers at Clonmore in fine preservation, and several other remains in various parts of the county. The chief towns are Carlow, Tullow, and Bagnalstown. II. A parliamentary borough, town, parish, and capital of the county, at the confluence of the Burren with the Barrow, 44 m. S. W. of Dublin; pop. of the borough in 1871, 7,778. The principal edifices are a fine court house, a jail, a parish church, a Roman Catholic cathedral and college, two nunneries, a lunatic asylum, infirmary, hospital, workhouse, barracks, and two bridges. There are several diocesan and national schools. The population are largely engaged in the provision trade. There are several flour mills and malt houses, and it is an important market for agricultural produce. The castle, of which the remains are still extant, built in the 12th century, was the nucleus of the town, which was made a borough in 1208.

CARLSBAD, or *Karlsbad*, a town of Bohemia, 70 m. W. N. W. of Prague; pop. in 1870, 7,276. It is situated in a narrow and picturesque valley on the Töpl, near its confluence with the Eger, and is neatly built. It is famous as a watering place, taking its name from the emperor Charles IV., who in the middle of the 14th century was the first to avail himself of the healing power of the springs, and whose statue adorns the market place. Next to Charles IV., the greatest benefactor of the town was a Scotch nobleman, the earl of Findlater and Seafield, who laid out some beautiful parks. An obelisk in his honor has been erected in a beautiful wood adjoining the town. The chief ingredients of the springs are sulphate of soda, carbonate of soda, and common salt; the principal springs are the Sprudel, Mühlbrunnen, Neubrunnen, Theresienbrunnen, and Schlossbrunnen, having respectively a temperature of from 165° to 118° F. The waters are efficacious in liver and kidney diseases, and in a variety of other complaints. They are exported to distant places, without being deteriorated by the journey. In 1853 a new spring was discovered by Dr. Mannl, containing carbonic and phosphatic oxide of iron.—In August, 1819, a congress was convened at Carlsbad by the German powers, principally with a view of crushing the

sedition spirit which at that time manifested itself especially at the universities. The assassination of Kotzebue by Sand afforded a pretext to the governments to carry out reactionary designs; and by the decrees promulgated at Carlsbad, Sept. 20, 1819, the Burschenschaften, or political unions of the students, were declared illegal, and other stringent measures adopted; but in April, 1848, these decrees, as far as they had been approved by the German diet, were rescinded by that body.

CARLSBURG, or **Karlsburg** (Hun. *Károlyi-Fejérvár*), a fortified town of Transylvania, on the Maros, 44 m. S. of Klausenburg; pop. in 1870, exclusive of the garrison, 7,955. It consists of the upper town or citadel, built on a hill, and surrounded by walls with seven bastions, and the lower town beneath. The principal gate of the citadel is adorned with fine sculptures. It is the residence of the Roman Catholic bishop of Transylvania and of a bishop of the United Greek church, and has a cathedral containing the tombs of many historical persons, two convents, a theological seminary, a gymnasium, an observatory, a mint, several libraries, an arsenal, a hospital, and several schools. From the lower town there is a bridge over the Maros. There are mines of gold in the vicinity. The town was originally called Weissenburg (Lat. *Alba Julia*; Hun. *Gyula-Fejérvár*), and received its present name from Charles VI. It was devastated by the Tartars in 1241, and rebuilt about a century later. In 1849 it was successfully defended by the Austrians against Gen. Bem.

CARLSKRONA, or **Karlskrona**, a seaport of S. Sweden, capital of the province of Blekinge, 240 m. S. S. W. of Stockholm; pop. in 1871, 16,234. It is built on a number of small islands, which are connected with each other and with the mainland by numerous bridges, and is the principal station of the Swedish navy. The town is strongly fortified, and has a safe and capacious harbor, which has everywhere sufficient depth of water for the largest vessels. The houses are well built, though wood is largely used in their construction. There is an extensive naval arsenal and dockyard. The principal edifices are the council house, the prefect's residence, public schools, and churches. The chief manufactures are naval equipments, linen cloths, tobacco, and refined sugar.

CARLSHAMN, or **Karlskhamn**, a seaport of Sweden, province of Blekinge, 26 m. W. of Carlskrona; pop. in 1868, 5,578. It is well built, has a small but secure harbor, a good market place, a town house, two churches, numerous factories, and an active trade in iron, timber, potash, pitch, and tar, and is a station for coasting steamers.

CARLSON, **Fredrik Ferdinand**, a Swedish historian, born at Upland, June 13, 1811. He graduated at Upsal, was tutor of the royal princes from 1837 to 1847, and in 1849 succeeded Geijer as professor of history at Upsal. Since 1850 he has represented the university

in the national diet, and from 1863 to 1870 was minister of ecclesiastical affairs. He is a member of the academy of sciences, and one of the 18 members of the Swedish academy. His principal work is a history of Sweden (in German, Hamburg, 1855; in Swedish, Stockholm, 1855-'6), a continuation of Geijer's in Heeren and Ukert's history of European states.

CARLSRUHE, or **Karlsruhe**, a city of Germany, capital of the grand duchy of Baden, 39 m. N. W. of Stuttgart, and 18 m. N. N. E. of Baden-Baden; pop. in 1871, 36,622. It stands on an elevated plain of the Hardt, about 5 m. from the Rhine. The town was built around a hunting seat erected in 1715 by Charles William, margrave of Baden, whose remains are interred beneath the pyramid dedicated to his memory upon the market place. Karlsruhe was designed in the form of an extended fan round the grand-ducal palace, from which, as a centre, 82 public avenues radiate, 11 of which, forming the principal streets, have been built on both sides. The new theatre and the academy are the finest buildings of Karlsruhe; the



New Theatre.

former, a commodious edifice, erected within a few years, being especially conspicuous. The palace, erected in 1751 on the site of the old structure, is built in the old French style of architecture, and consists of a large centre building and two wings. It presents nothing remarkable except the *Bleithurm* (lead tower), which affords a fine view over the city and surrounding country. Of the public squares, the palace and market squares are the most beautiful. The educational institutions of Karlsruhe are remarkable, especially the polytechnic institute, which is attended by many pupils from distant countries. It has a lyceum, a seminary for teachers, a military academy, an academy of design, painting, and engraving, a cabinet of natural history, a gallery of engravings, a grand-ducal archaeological cabinet and one of medals, a court library with 90,000 volumes, and a public library with 105,000. The public parks and the trees planted in the squares constitute the chief beauties of the place. There are seve-

ral palaces belonging to the Baden nobility, and about 100 public buildings, including the churches, the mint, the school houses, the hospitals, &c. Among the hospitals is one endowed with \$44,000 by the celebrated London tailor Stultz, who was a native of Baden, and whose munificence was rewarded by the grand duke with the title of baron. A majority of the inhabitants are Protestants. The new Protestant church, built in 1807, is a noble Roman structure. The synagogue is in oriental style, and the Catholic church has a fine portico with eight Ionic pillars. There are here some manufactures of silks, woollens, carpets, jewelry, and chemicals.

CARLSTAD, or **Karlstad**, a town of Sweden, province of Wermland, 160 m. W. of Stockholm; pop. in 1868, 5,488. It stands on an island near the N. E. shore of Lake Wener. Among the public buildings are a cathedral, a college, a cabinet of natural history, and an observatory. The exports are copper, iron, corn, salt, and timber. The railway connecting Stockholm and Christiania passes the town, and its commerce is greatly facilitated by the Gotha river and canal, making, with Lakes Wener and Wetter, a continuous navigation between the Baltic and Cattegat. The town and its vicinity are noted for fine fishing and shooting. It was entirely destroyed by fire in 1865, and rebuilt on an improved plan.

CARLSEADT, a town of Croatia. See **KARLSTADT**.

CARLSTADT, **Andreas**, a German reformer, born at Karlstadt, in Franconia, about 1488, died in Basel, Dec. 25, 1541. He adopted the name of his native town, but his real name was Bodenstein. He took his degree of D. D. at Wittenberg, was appointed professor in that university, and subsequently advanced to the dignities of canon, dean, and archdeacon. From the commencement of the reformation he was one of its most zealous adherents. In 1519 he held a controversy at Leipsic with Eckius on the doctrine of free will, in which he proved himself so decided an antagonist of Catholicism, that he was soon after excommunicated by the pope. This severity on the part of his opponents, and his own impulsive temperament, hurried him into a course, in 1521-'2, which Luther and Melancthon severely condemned. He entered the great church of Wittenberg at the head of an infuriated multitude, and destroyed the crucifixes, images, and altars. He rejected the title of doctor, abandoned his professorship, applied himself to manual labor, and affirmed that learning was useless to Biblical students, who ought rather to toil like him with their hands than waste their time in the acquisition of unprofitable knowledge. After Luther's return from the Wartburg, the old order of things was restored in the church of Wittenberg; but Carlstadt went two years afterward to Orlamünde, in the electorate of Saxony, where he forcibly took possession of the pulpit, creating disorder, which was again denounced

by Luther. Expelled from Saxony, he brought forward the question of the real presence of the body and blood of Christ in the eucharist, avowing himself the antagonist of Luther, and defending the extreme Protestant view of that doctrine. Suspected of sympathizing with the peasants' war in Franconia, he continued to give umbrage to the authorities, and led for several years an unsteady nomadic life. Reduced to extreme poverty, he appealed to Luther, who granted him assistance and a domicile near Wittenberg, under the condition that he would refrain from giving utterance to his religious opinions. Having quietly spent about three years in agricultural and commercial occupations, he again came forward in 1528 with several violent publications; and to escape from the indignation of Luther, against whom he was believed to have planned conspiracies, he betook himself to Denmark, East Friesland, Strasburg, and finally to Zürich, where he was kindly received and assisted by Zwingli. He was appointed archdeacon at Zürich, and from 1534 to the time of his death he was preacher and professor of theology in Basel. He had a numerous body of followers in Germany, who were denominated Carlstadtians or Sacramentarians. He was the first Protestant divine that married.—See *Andreas Bodenstein von Karlstadt*, by F. E. Jäger (Stuttgart, 1856).

CARLTON, a N. E. county of Minnesota, bordering on Wisconsin; area, about 900 sq. m.; pop. in 1870, 286. Its N. E. corner is intersected by the St. Louis river, and it is watered by Kettle river and several streams that fall into Lake Superior. The Northern Pacific and the Lake Superior and Mississippi railroads traverse it. The surface is uneven and partly covered with forests of pine and sugar maple.

CARLYLE, **Joseph Dacre**, an English oriental scholar, born in Carlisle in 1759, died at Newcastle-upon-Tyne in 1804. He was educated at Cambridge, and elected fellow of Queen's college, where in 1794 he was appointed professor of Arabic. He was afterward chaplain to the embassy at Constantinople, and collected there valuable Greek and Syriac MSS. He projected a revised edition of the New Testament with the aid of these MSS., but did not live to complete his plan. He was the author of a translation of an Arabic history of Egypt; a volume of translations of Arabic poetry from the earliest times to the extinction of the caliphs; a posthumous volume of poems descriptive of the scenes of his travels; and an unfinished edition of the Arabic Bible.

CARLYLE, **Thomas**, a British author, born at Ecclefechan, Dumfriesshire, Scotland, Dec. 4, 1795. He was educated at Annan and afterward at Edinburgh, where Edward Irving, three years his senior, was a fellow student. Irving undertook to conduct a school at Kirkcaldy, and invited Carlyle, then 18 years old and just graduated at the university, to become his assistant. "To Kirkcaldy," says Carlyle, "I went. To

gether we talked and wrought and thought; together we strove, by virtue of birch and book, to initiate the urchins into what is called the rudiments of learning; until at length the hand of the Lord was laid upon him, and the voice of his God spake to him saying, Arise and get thee hence; and he arose and girded up his loins. And I tarried awhile at Kirkcaldy, endeavoring still to initiate the urchins into the rudiments of learning. I had been destined by my father and my father's minister to be myself a minister of the kirk of Scotland. But now that I had gained man's estate, I was not sure that I believed the doctrines of my father's kirk; and it was needful that I should now settle it. And so I entered my chamber and closed the door, and around me there came a trooping throng of phantasms dire from the abysmal depth of nethermost perdition. Doubt, fear, unbelief, mockery, and scoffing were there; and I wrestled with them in agony of spirit. Thus it was for weeks. Whether I ate I know not; whether I drank I know not; whether I slept I know not. But I know that when I came forth again it was with the direful persuasion that I was the miserable owner of a diabolical arrangement called a stomach." Thus, in his 23d year, he contracted that chronic dyspepsia which has tormented him through life, and given tone to most of his writings. He was at this time in Edinburgh, where he had begun the study of divinity. Having decided that he could not become a minister, he cast about to settle upon his way of life. Leaving Edinburgh, he was for a while tutor in a private family, and made himself master of the German language and literature. Then returning to Edinburgh, he entered upon his chosen profession, that of "a writer of books." He translated Legendre's geometry, to which he prefixed an "Essay on Proportion," and wrote the "Life of Schiller," which was originally published in the "London Magazine," 1823-4. About the same time he translated Goethe's *Wilhelm Meister*. In 1826 he married Jane Welch, a lineal descendant of John Knox, who died in 1866. She appears to have brought him some property, and he went to reside upon her small estate of Craigenputtoch, among the granite hills and black morasses of the wildest part of Dumfriesshire, 15 miles from a town. During his six years' residence here he studied, thought, and wrote with untiring activity. He completed the "Specimens of German Romance" (3 vols., 1827), comprising translations from Jean Paul, Tieck, Musäus, and Hoffmann, names then almost unknown in Great Britain; wrote many biographical sketches for the "Edinburgh Cyclopædia;" and began the series of essays now known as his "Miscellanies." The first of these, on Jean Paul Richter, appeared in the "Edinburgh Review" for 1827, followed within the next two years by several of the best of them all, notably those on Burns and Novalis. These critical and biographical essays, forty in number,

were collected in 1845 by Ralph Waldo Emerson, and republished in America, and among them are fully a score that rank as the best in the language. "Sartor Resartus" was written in 1831, and the next year Carlyle went with it to London, and upon his arrival there took up his residence in a modest house in Chelsea, in which he has lived ever since. At first he met ill success with his manuscript. The "reader" for one publisher said that the work was beyond doubt that of a man of talent, but that it was disjointed and fragmentary; the humor was very German and very heavy; was not the book, in fact, a translation from the German? The publisher declined the book with thanks, but intimated that the author might do better some day. Failing to find a publisher in book form, *Sartor Resartus*, "The Stitcher Restitched," appeared in "Fraser's Magazine" in 1838-4. From all that appears, it does not seem that there was in all England a single reader who found it other than a very absurd and altogether stupid production. The work purports to be extracts from a book on the "Philosophy of Clothes" by Godborn Deviladung (*Diogenes Teufelsdröckh*), born at Duckpuddle (*Entepfuhl*), and professor of matters and things in general at the university of Don'tknowwhere (*Weissenichtwo*), with notices of the life and opinions of the author. The scope of it is, that all forms, creeds, and institutions are but the garments in which man has from time to time clothed himself, and that for the most part these garments are sadly out of repair. It is a critique upon the civilization of the age. Intermingled with much that is simply grotesque either in thought or expression, there are passages which, for lofty eloquence, keen insight, and trenchant satire, are not surpassed by anything in the language. Hitherto the style of Carlyle, though nervous and idiomatic, had been pure and graceful. In "Sartor Resartus" he adopted here and there, and not unfrequently, that involved, intertwined, and contorted manner which thenceforth became the most obvious characteristic of most of his writings. In 1837 was published "The French Revolution, a History," the first of Carlyle's works to which his name was formally attached. It is less a history than a series of tableaux from the history of the revolution, presupposing the reader to be acquainted with the general course of the events. The remarkable essay on "Characteristics," written in 1831, marks the time when Carlyle had begun to embrace that doctrine of pessimism, which finally became the leading principle in his philosophy. Taking his own confirmed dyspepsia as a sort of starting point, he educes the axiom that unconsciousness is not only the sign but the condition of health in the individual and in society. It is the sick, not the well, who are consciously aware of their state. The present age is a self-conscious and therefore a diseased one. "All this talk about the improvement of the age, the spirit of the

age, the march of the intellect, and the progress of the species, is evidence of an unhealthy state, the precursor and prognostic of still worse health." This idea crops out in the "French Revolution" and many of the essays, and in some of his later works is developed still further into the assumption that all nobleness, virtue, and belief have died out of the world; that modern civilization is a hollow sham; and that mankind are worse and worse off than they were 500 years ago. "The French Revolution," notwithstanding the critics of the day, made an immediate mark. Its publication was delayed by the accidental burning of the manuscript of the second volume just as it was ready for the printers. A friend borrowed it to read, and he in turn lent it to another. The latter having left it at night in a confused heap on his library table, the servant in the morning used nearly the whole of it to kindle a fire. Carlyle set about rewriting it, but failed in the first attempt through mental depression. He then devoted several weeks to novel-reading as a relaxation, and so finally succeeded in re-producing his destroyed work. In 1839 he published a small work on "Chartism," in 1840 "Heroes and Hero Worship," and in 1848 "Past and Present," chiefly notable for their extreme pessimist views, and for the extent to which the affectation in style was carried. During these years he also wrote for the "Edinburgh Review" and the "Foreign Quarterly Review," and contributed to "Fraser's Magazine" some of his best papers, notable among which were "Count Cagliostro" and "The Diamond Necklace." After 1844 he furnished few contributions to periodical literature. In 1845 he published the "Letters and Speeches of Oliver Cromwell," with copious remarks and annotations, a work which has done more than any other to set in its true light the character of the great lord protector. In 1850 he published a series of "Latter-Day Pamphlets," dealing with the questions of the day, and by far the least valuable of his works. In 1851 appeared the "Life of John Sterling," an admirable biography, in which he returned to the earlier purity of style which characterized the "Life of Schiller." He had in the mean while been long engaged upon the "History of Friedrich the Second, called Frederick the Great." The first two volumes appeared in 1858, two more in 1862, and the concluding two in 1864. With this work Carlyle's literary life may probably be supposed to have closed. In 1865 he was elected rector of Edinburgh university, and delivered his inaugural address April 2, 1866. During the American civil war he was open in avowing his belief in the overthrow of the republic. In 1869 he published a magazine article in the manner of his "Latter-Day Pamphlets," entitled "Shooting Niagara," in which he vehemently opposed the project of electoral reform in Great Britain. During the Franco-German war he took sides with Germany, and in November, 1870, pub-

lished in the "Times" two long letters on the subject.—Carlyle's merit as an essayist is undisputed. His claim to the highest place is called in question in favor of no one, unless it be Macaulay. As a historian he brings to his work the first great requisite of unwearied industry in the collection of facts. The brilliant pictures in the "French Revolution" are elaborated to the minutest detail from an immense mass of contemporary narratives. For "Frederick the Great" he appears to have read and noted every book, pamphlet, and despatch published in relation to that monarch, and to have examined innumerable maps and prints in order to make himself master of every point in topography and local scenery. His descriptions of campaigns and battles are exceeded by nothing in military literature. Viewed as a series of pictures, his two histories have certainly no superior, perhaps no equal, and their effect in this regard is enhanced rather than diminished by the idiosyncrasies in manner which he has chosen to adopt. But he lacks that soundness of judgment which forms the still higher requisite of a great historian. Everything is colored and distorted by the medium through which he looks. In his pessimist philosophy there are but three virtues: earnest belief, which has long since gone from the world; force and audacity, which overcome every obstacle; and a prudent thrift, which makes the best of a bad state of things. He has a sort of liking for Benjamin Franklin because "he taught the American people how by frugality and labor a man may buffet the waves of fortune, and swim straight on to prosperity and success." In a man whom he likes he can see little that is bad; in one whom he dislikes nothing either good or even worthy of respect. Mirabeau and Danton are eulogized for their rude force; Robespierre is only a contemptible sea-green cockscomb playing the part of ruler. In Bonaparte he sees only "the great highwayman of history, whose habit was to clutch king or kaiser by the throat, and swear that if they did not stand and deliver he would blow their brains out; and who did a profitable trade at this sort of thing until another man, Arthur, duke of Wellington, who had learned the trick, succeeded in clutching him, and there was the end of him." Frederick had the virtues of force and thrift, the only ones now or for some generations extant, and so he makes a hero of him. Carlyle wholly lacks the power of intellectual perspective. Everything is great or small, not as it is in itself or in its relation to other things, but in proportion as it is picturesque. The life of Frederick is full of episodes in which the most trifling details are elaborated as they would be in a novel. The march of the history is stayed while the writer is picking weeds or flowers by the wayside. For literature, after his early enthusiasm for that of Germany, he affects supreme contempt. Men who know him best, and some who have heard Coleridge talk, say that they

never knew what table talk could be until they had listened to Carlyle seated, pipe in mouth, under an awning in the yard of his modest home.—Carlyle's works have been issued from time to time in almost every shape and form. His "Complete Works" have been published in 80 vols. 8vo, with three additional volumes of translations (London, 1869-'71).

CARMAGNOLA, a town of Italy, in the province and 18.m. S. S. E. of Turin, on the river Mella; pop. about 16,000. It is noted for its silk fairs, which take place in June, and contains several fine streets and public squares, five churches, and a hospital.

CARMAGNOLA, *Francesco*, an Italian *condottiere*, whose real name was Bussone, born at Carmagnola about 1390, executed in Venice, May 5, 1432. The son of a peasant, he was a herdsman in his youth; but enlisting in the service of Filippo Maria Visconti, duke of Milan, he rapidly rose in rank, and aided his master in regaining a great part of Lombardy, and in extending his possessions. The duke, however, became suspicious of his loyalty, confiscated his property, cast his wife and children into prison, and banished him; upon which Carmagnola entered the service of the republic of Venice, from which he received the appointment of generalissimo. He wrested Brescia from the duke of Milan, and entirely routed his army at the battle of Macalo in 1427. After the battle he released his prisoners; but incurring the suspicions of the Venetian senate for doing so, and his subsequent military operations not proving successful, he was recalled to Venice, under the pretext that his advice was needed for affairs of state, was placed under arrest, accused of treason, put to the torture, and beheaded.

CARMAGNOLE, a French song and dance of the revolutionary era, which greatly contributed to exasperate the people against Louis XVI. and Marie Antoinette, who were lampooned in it as *Monsieur* and *Madame Vêto*. The song consists of 12 stanzas, the first commencing with the words,

"Madame Vêto avait promis
De faire égorger tout Paris,"

and each ending with

"Dansons la carmagnole,
Vive le son du canon."

The multitude in the streets danced to the music of the song amid the wildest enthusiasm, which was equally displayed in the theatres and on the battle field when it was played by the military bands. It was suppressed by Bonaparte after the establishment of the consulate. The name is said to have originated from the waistcoat worn by the Marseillais who took a conspicuous part in the insurrection of Aug. 10, 1792, the song appearing soon afterward; but the name of its author remained unknown. The appellation was also applied to the costume of the terrorists, to the most violent Jacobins, to the speeches of

Barère, and to the soldiers of the republic. The waistcoat called by this name is believed by some authorities to have originated in Carmagnola, near Turin.

CARMARTHEN, or *Carmarthen*, the chief town of Carmarthenshire, Wales, a municipal and parliamentary borough, situated upon the river Towy and upon the Great Western and South Wales railway; pop. in 1871, 10,499. It is the terminus of the Carmarthen and Cardigan railway from the north and of the Llandeilo railway from the east. Its site is uneven and its streets are irregular, but it commands a fine view of the Towy. It has a handsome guildhall with a grain market beneath, and a fine building for the assembly rooms. There are a grammar school, a Presbyterian seminary, a training college, national and infant schools, an infirmary, and literary and scientific institutions. There are iron and tin works in the neighborhood, and the town has a good foreign and coasting trade. The harbor is 8 m. below the town, near Carmarthen bay. Richard Steele was buried here.

CARMARTHENSHIRE, a county of Wales, bordering on Cardiganshire, Brecknockshire, Glamorganshire, the British channel, and Pembrokeshire; area, 947 sq. m.; pop. in 1871, 116,944. It is mountainous, the highest range being the Mynydd Du or Black mountains in the southeast. The river Towy, rising in Cardiganshire, flows S. W. through the county, and falls into Carmarthen bay. The valleys are noted for the beauty of their scenery. The county is traversed by the South Wales and other railways. It was the scene of the final struggle of the Welsh under Llewellyn, their last native prince; and it was long in a disturbed state, as is shown by the castles, of which there are many remains.

CARMEL (Heb., wood land or garden land), a range of limestone hills in N. W. Palestine, terminating at the sea in the promontory of Mt. Carmel, forming the southern boundary of the bay of Acre. The average height is 1,500 ft., the highest elevation being 1,728 ft. above the sea. Carmel is celebrated for the salubrity of its climate and the fertility of its sides and slopes. Although cultivation has ceased, enough remains in the timber, the wild olive, and the pasture to bear out its ancient repute. It is also noted for its medicinal and aromatic herbs. It is the scene of some of the great events of Biblical history, having been the retreat of the prophets Elijah and Elisha. The brook Kishon runs at the foot of Carmel. A convent is situated on this mountain, where travellers are entertained. A few years ago a German colony settled at the foot and on the sides of Carmel, and introduced a system of cultivation which promises to restore its fertility.

CARMELITES, an order of friars in the Roman Catholic church. Mt. Carmel appears to have been a favorite place of resort for Hebrew ascetics, and after the Christian era hermits were fond of fixing themselves in the same region; and hence appears to have sprung up among the Car-

melites the tradition that their order was founded by the prophet Elijah upon Mt. Carmel. The account of the origin of the order given by the Bollandists, though violently opposed by the Carmelites, is generally followed. A crusader of the 12th century, Berthold, count of Limoges, made a vow in the heat of battle to embrace a monastic life if he obtained the victory; and the battle being won, he fulfilled his vow by retiring to a cave on Mt. Carmel, called the cave of the prophet Elijah. He was accompanied by some others, and their increasing numbers made it soon necessary to build a monastery. Berthold's successor obtained a rule from Albert, patriarch of Jerusalem, which was confirmed by Pope Honorius III. in 1224. Under Alanus, their fifth general, the Carmelites migrated to Europe, to escape from the persecution of the Saracens; and a modified rule, suited to the western climate and manners, was adopted and approved by Innocent IV. This order, which was very severe, extended itself widely, and gained a high reputation in Europe. The female branch of the order was founded by John Soreth in the 15th century. In process of time, great relaxation having been introduced into the rule, St. Teresa and St. John of the Cross (1562) set on foot in Spain a reformation, on the basis of the original rule of Albert, as modified by Innocent IV. This resulted in a division of the order into two branches—the reform being known as Discalced Carmelites. The houses of this order have shared the general fate of religious communities in many parts of Europe. They have maintained houses in Ireland, and within a few years have established themselves in Kansas. A convent of Carmelite nuns founded at Port Tobacco in 1790, and subsequently removed to Baltimore, was the first convent established in the original territory of the United States. There is a second convent near St. Louis. This order was the first to admit the laity to participate in the prayers and good works by giving them the scapular worn by the friars in a reduced shape; and this, under the name of scapular of our Lady of Mount Carmel, continues to be a favorite devotion with Roman Catholics. (See SCAPULAR.)

CARMINE, the coloring matter of cochineal. To separate it, cochineal is exhausted with boiling water, and the clear decanted liquid is treated with cream of tartar, alum, or acid oxalate of potassium. The fatty and albuminous

matters then coagulate, and carry down the coloring matter with them. By treating a solution of cochineal with an alkaline carbonate and alum, a compound of the coloring matter with alumina is obtained, known by the name of carmine-lake. The cheaper sorts of carmine are sometimes adulterated with extract of Brazil wood and cheaper vermillion. Cochineal colors are used for dyeing wool and silk crimson or scarlet; but the colors are not very durable, and are easily soiled by water or alkalis. Carmine is also used in the manufacture of red ink, as a cosmetic, as a pigment in water colors, and in the preparation of artificial flowers. It is said that the color was accidentally discovered by a Franciscan monk at Pisa, who was engaged in preparing a medicine of cochineal and salt of tartar.—Several processes are in use for the preparation of carmines, one of the best of which is thus given in the *Annales de l'industrie*: Two pounds of the finest cochineal in powder are to be put into a vessel containing six pailfuls of boiling soft water; and the boiling is to be continued for two hours, when three ounces of pure saltpetre, and soon after four ounces of binoxalate of potash, are to be added. After ten minutes the boiling is to be discontinued, and the liquor is allowed to stand for four hours. It is then to be drawn off with a siphon into flat glazed diaphs, and left for three weeks. A coating of mould forms upon the surface, which is to be nicely removed in one piece; or if any fragments remain, they must be taken out with the greatest care. The liquor is again to be drawn off with a siphon, leaving the cake of carmine in the dish, when it is to be carefully dried in a clean shady place. As carmine is desired to be used principally as *rouge*, for imitating the soft blush upon the fairest cheeks, it is an especial object to obtain it of the highest degree of perfection; and so delicate are the processes of the French that the result is affected by the condition of the weather, and the best carmine is only made on bright sunny days. Sir Humphry Davy relates an incident of an English manufacturer agreeing to pay £1,000 to a Frenchman for the secret by which the latter made so superior an article; when it appeared that the only difference in the two modes of preparation was that the Frenchman always selected such fine bright weather as the Englishman could not hope to command in his own country. (See COCHINEAL.)

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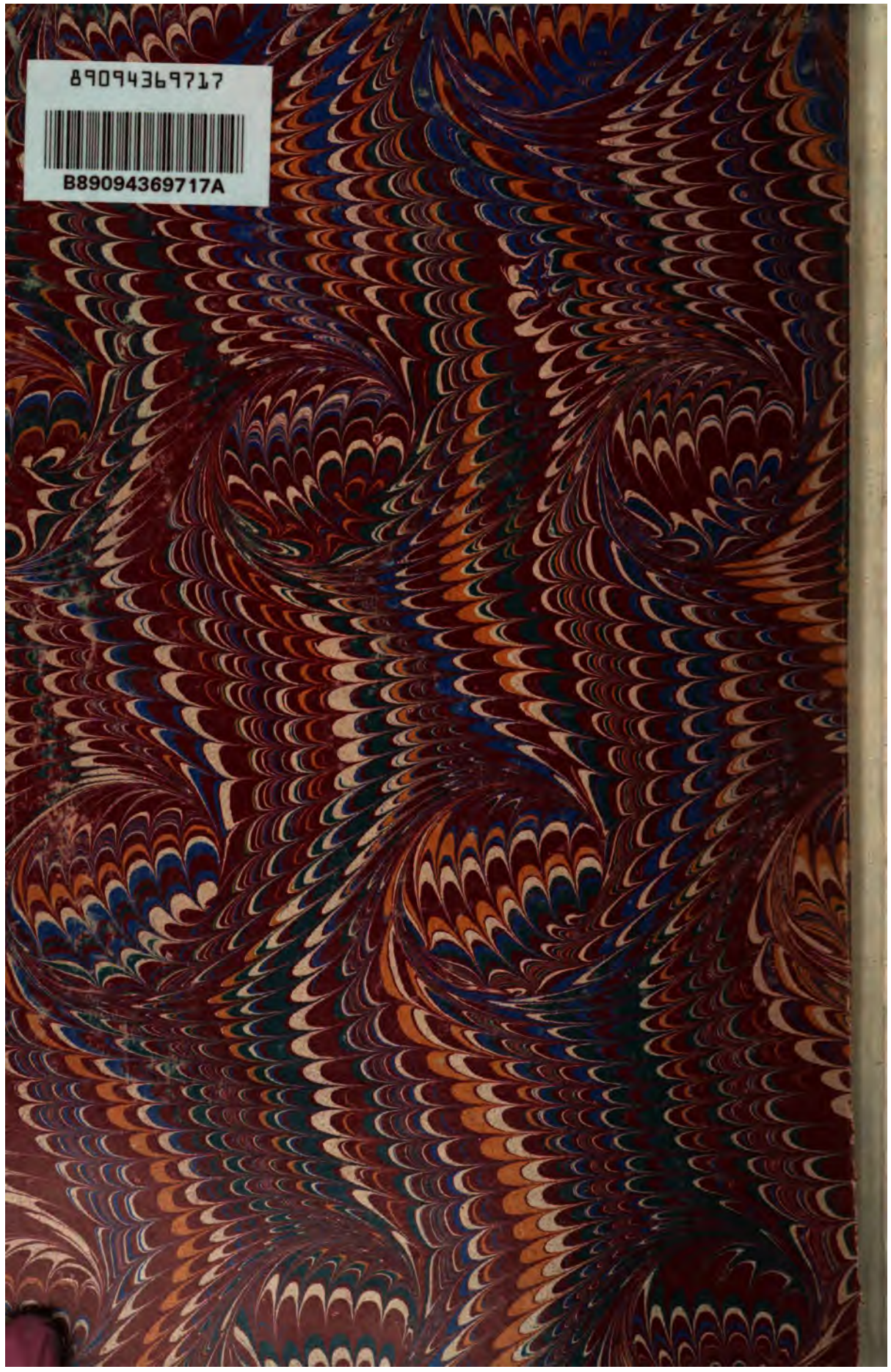
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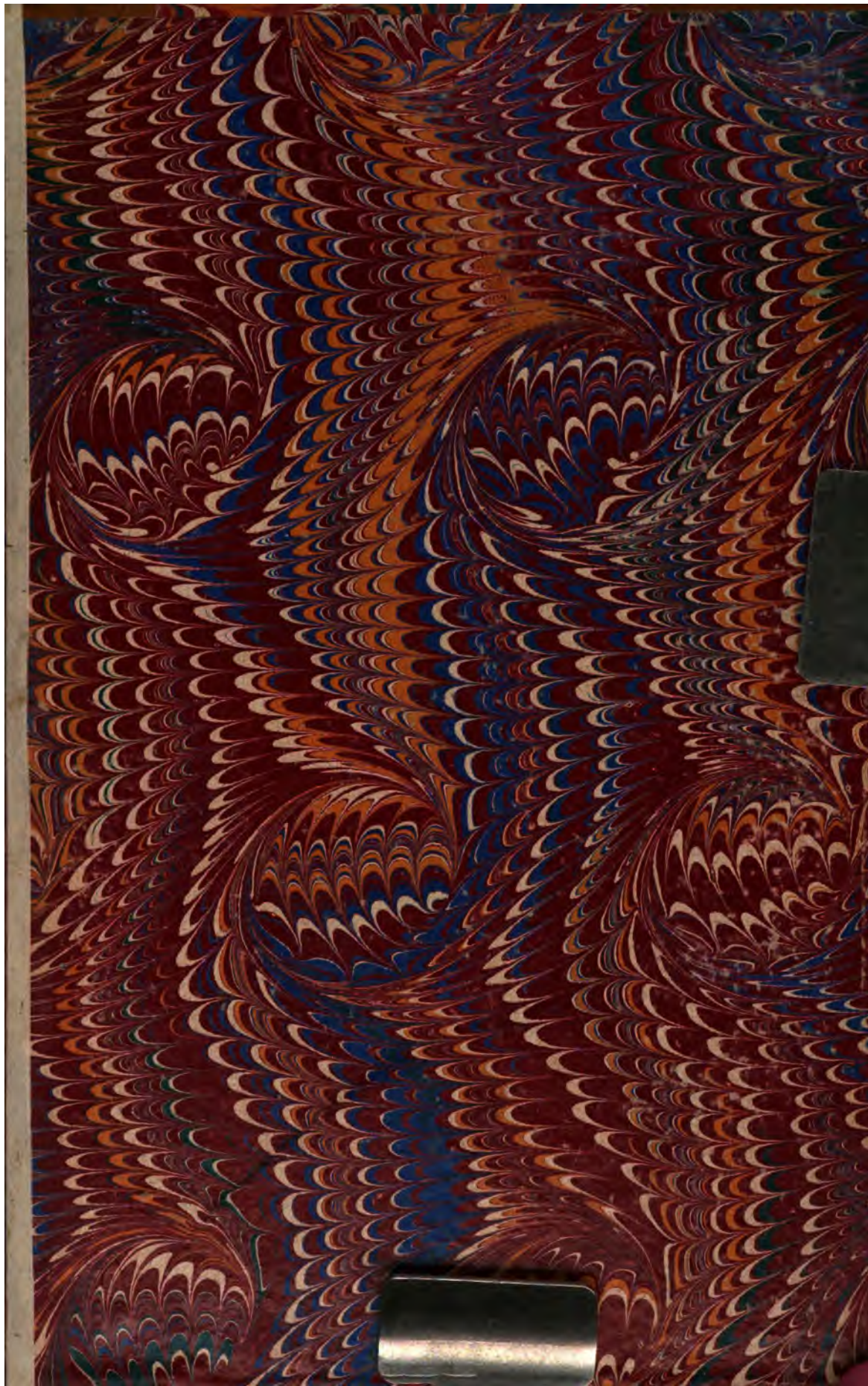


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